Vol. III March, 1908 No. 1

Bulletin of the Stout Training Schools

Syllabus Number
1908 - 1909

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OF THE
STOUT
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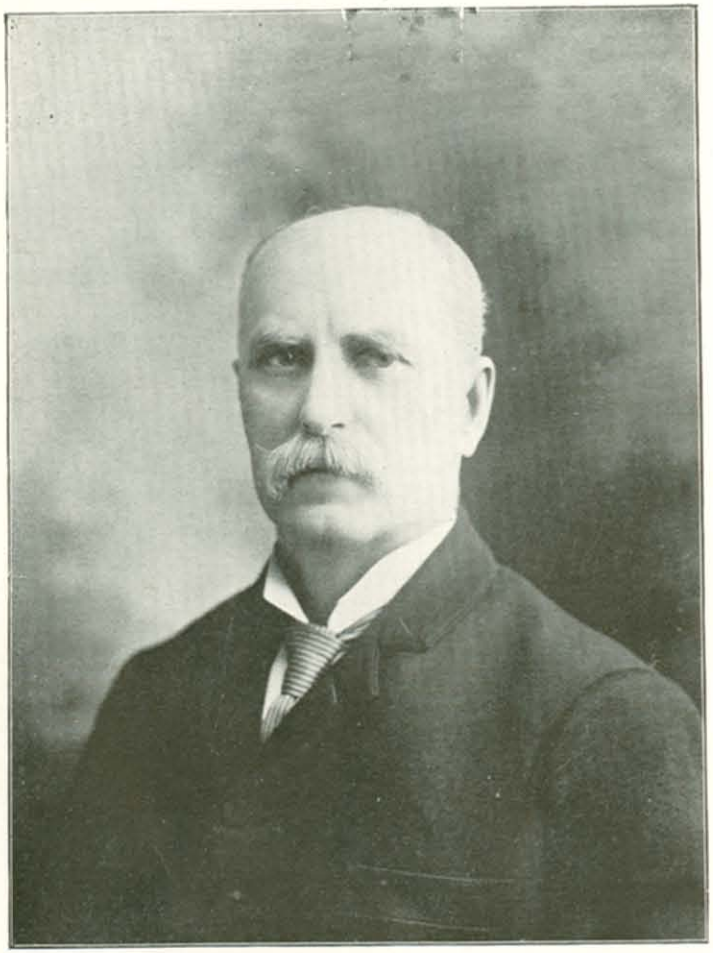

L. D. HARVEY
SUPERINTENDENT STOUT TRAINING SCHOOLS

Vol. III March, 1908 No. 1

BULLETIN
OF THE
STOUT TRAINING SCHOOLS

Announcement
Stout Training Schools
Year 1908-1909

Syllabi of Courses

Physical Training Results
in Menomonie

PUBLISHED QUARTERLY
BY THE
STOUT TRAINING SCHOOLS
AT
MENOMONIE WISCONSIN

BURDICK & ALLEN
MILWAUKEE

ANNOUNCEMENT OF THE STOUT TRAINING SCHOOLS

1908-1909

OFFICERS OF ADMINISTRATION AND INSTRUCTION

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FACULTY

L. D. Harvey, Superintendent of Schools; Phychology and Pedagogy; General Superintendent of Professional Work; Elementary Education.
Milton College, 1872. High School Principal, 1873-1879; City Superintendent, 1880-1885; Normal Schools, 1885-1898; State Superintendent, 1889-1902; Stout Training Schools, 1903-

George Fred. Buxton, Director of Training School for Manual Training Teachers; Drawing and Design; Organization and Management.
Pratt Institute, 1899; Teachers College, Columbia University, 1904. Teacher of manual training, Newark, New Jersey, 1899-1901; Portland, Maine, 1901-1903; Springfield, Massachusetts, 1904-1905; Stout Training Schools, 1905-

Howard D. Brundage, Elementary and Advanced Woodwork.
Cabinet and Pattern Making and Building Trades, 1889-1898; Teachers College, Columbia University, 1900. Teacher of manual training, Stamford, Connecticut, 1900-1902; Hartford, Connecticut, 1902-1905; teacher of hammered metal and enamel work in Arts and Crafts Society, Hartford, Connecticut, 1902-1905; Stout Training Schools, 1905-

Leo Ammann, Machine Shop Practice.
St. Louis Manual Training School, 1893; Cornell University, mechanical engineering, 1897; Federal Polytechnikum, Zurich, Switzerland, post-graduate work, 1898. Teacher in St. Louis Manual Training School, 1901-1905; Stout Training Schools, 1905-

Louis F. Olson, Mechanical Drawing, Forging, Manual Training Equipment.
Drafting and general shop work, 1902-1904; Stout Training School for Teachers of Manual Training, 1906; graduate student and assistant in woodwork and mechanical drawing, 1906-1907. Stout Training Schools, 1907-

———— ————, Elementary Woodwork.

Newton Van Dalsem, Student Assistant in Woodwork (1907-1908).
Wood turning and general shop work, part time, 1901-1903; Menomonie High School with special work in manual training, 1902; Teacher manual training Mayville, Wis., 1903, Chippewa Falls, Wis., 1903-1905, Burlington, Iowa, 1905-1906; foreman sash and door factory, summer 1906; student Stout Training Schools, 1906-1908.

Laura G. Day, Director of Training School for Domestic Science Teachers; Food Materials and Food, Household Economy and Management.
Kansas State Agricultural College, 1893; post-graduate work domestic science, 1894. Assistant in domestic science and arts department, Kansas State Agricultural College, 1894-1895; teacher of domestic science and arts, Stout Manual Training School, Menomonie, Wis., 1895-1900; special lecturer and director of department of domestic economy, Purdue University, LaFayette, Ind., 1901-1902; Stout Training Schools, 1903-

Nellie W. Farnsworth, Physiology and Hygiene; Home Nursing and Emergencies; Preceptress Bertha Tainter Hall.
River Falls Normal School, 1892; Stout Training School for Teachers of Domestic Science, 1905. Supervisor of music, 1893-1902; teacher Duluth State Normal School, 1903-1904; Valley City State Normal School, 1905-1906; Stout Training Schools, 1906-

Anna K. Flint, Dressmaking.
University of Wisconsin, 1895; special work domestic science, Stout Manual Training School, 1898-1900; Teachers College, Columbia University, 1905-1906. Teacher of sewing and assistant in domestic science department, Stout Manual Training School, 1900; teacher of sewing and dressmaking, Stout Training Schools, 1903-1904; Stout Training Schools, 1906-

Lurene Seymour, Textiles and Millinery.
University of Michigan, 1895; New York University, 1905; Teachers College, Columbia University, 1907. Teacher, Lake Linden, Michigan, High School, 1895-1898; Decatur, Illinois, High School, 1898-1906; Stout Training Schools, 1907-

Mrs. Marion S. Arnold, Director Training School for Home Makers; Food Study, Cooking, Sewing, Household Management, Care of Children.
Stout Training School for Domestic Science Teachers, 1906; Matron, Bertha Tainter Hall, 1906-1907; Stout Training Schools, 1907-

Zella I. Perkins, Chemistry.
University of Idaho, 1903; post graduate work, University of Chicago, 1906. Assistant pure food department, University of Idaho, 1903-1904; teacher science, High School, Colfax, Washington, 1904-1905; Stout Training Schools, 1906-

Wm. Urban, Bacteriology, and Physics.
University of Wisconsin, 1904. Teacher science, High School, Sheboygan, Wisconsin, 1904-1906; Stout Training Schools, 1906-

Alma L. Binzel, Director of Kindergarten Training School; Kindergarten Principles, Theory and practice; History of Education; Supervisor of Practice Teaching in the Kindergarten.
Kindergarten Training Department, Milwaukee State Normal School, 1894; Teachers College, Columbia University, 1906. Director of Model Kindergarten and Assistant in Kindergarten Training Department, Milwaukee State Normal School, 1895-1903; Stout Training Schools, 1906-

Mary D. Bradford, Supervisor of Primary Work; Theory and Practice in Primary Teaching; Inspection and Supervision; Nature Study.
Teacher Kenosha High School, 1884-1894; supervisor of practice teaching and director of Model School, Stevens Point Normal School, 1894-1906; Stout Training Schools, 1906-

Cora Barron, Critic Teacher and Director of the Codington Kindergarten; Gifts, Stories, Games and Occupations.
Stout Kindergarten and Primary Training School, 1903; Indiana Kindergarten, and Primary Normal Training School, Normal course, Indianapolis, 1904. Director of Yandes St. Kindergarten, Indianapolis, 1904; Stout Training Schools, 1904-

Mary Ehrhard, Critic Teacher and Director North Menomonie Kindergarten; Clay Modeling and Manual Work.
Menomonie Kindergarten Training School, 1900. Stout Training Schools, 1903-

S. H. Metcalf, Director of Music in Public Schools; Theory of Music, Note Reading, Kindergarten Songs, and Chorus Work.
Stout Training Schools, 1900-

Lelia Bascom, English.
Chicago City Training School, 1896; University of Wisconsin, 1902. Teacher of English, High School, Escanaba, Michigan, 1902-1904; teacher of English and History, High School, Fort Morgan, Colorado, 1904-1906; Stout Training Schools, 1906-

Kate Murphy, Director of Art Department; Design and Illustration; House Decoration and Furnishing.
St. Louis School of Fine Arts, 1887-9. New York School of Technical Design, 1889-90; New York Studios, 1890-1892. Director art department, Elmwood Normal School, Farmington, Mo., 1888-9; teacher of drawing in public schools of Chicago, 1893-1894; Menomonie Public Schools and Stout Training Schools, 1894-

Pearl H. Cook, Assistant in Art Department; Blackboard Drawing and Color Work.
Chicago Art Institute, 1902; Pratt Institute, 1905. Teacher Fort Wayne School of Art, Fort Wayne, Ind., 1905-'07; Stout Training Schools, 1907-

A. H. Plag, Director of School of Physical Training; Theory and Practice of Physical Training.
Normal School of the North American Gymnastic Union, 1903. Instructor in athletics and physical training in Y. M. C. A., Minneapolis, Minn., 1904-1907; Stout Training Schools, 1907-

Julia Bigelow, Assistant in School of Physical Training.
Normal School of the North American Gymnastic Union, 1906. Stout Training Schools, 1906-

Grace R. Darling, Librarian.
University of Michigan, 1884; Teachers College, Columbia University, 1892; Wisconsin Library School, Madison, Wis., 1907. Teacher of History and Literature, State Normal School, Oshkosh, Wis., 1884-1891; teacher of History and English, State Normal School, Milwaukee, Wis., 1895-1903; Stout Training Schools, 1908-

Francesca L. Otto, Secretary and Appointment Clerk.
University of Indiana, 1897; Vories' Business College, Indianapolis, Indiana, 1900. Teacher Latin and German, High School, Bluffton, Indiana, 1897-1900; commercial branches, High School, Marinette, Wisconsin, 1901-1903; Stout Training Schools, 1903-

Emma Olson, Assistant Secretary.
Stout Training Schools, 1907-

PURPOSES AND SCOPE OF WORK

THE Stout Training Schools are organized to provide facilities for the thorough preparation of teachers and supervisors in the fields of manual training, domestic art and science, kindergarten and primary work.

The work which each school undertakes to do in its field is three-fold—academic, technical, and professional. The academic involves the mastery of the subject-matter of the courses, as a matter of knowledge. The technical involves a mastery of the handwork regarded as valuable for training purposes, as a matter of skill. The professional involves a study of educational principles and processes, and practice in applying them in the organization and administration of work in its particular field of educational effort, and a study of the relation of its special work to other phases of the public school curriculum.

While each of these three phases has a content of its own and receives special treatment, the professional phase permeates the entire work in the other two. It appears in the academic work when students are led to observe and consider their own mental processes; to determine the use to be made of the subject-matter in their subsequent work as teachers, and how they are to use it most effectively. It appears in the technical work as it proceeds when they are led to observe the order of development; to determine whether the particular order followed is essential or not; to note the character and relation of mental and motor activities appropriate and necessary for the proper development of the pupils they are likely to teach.

From beginning to end students are impressed with the idea that they must not only have accurate knowledge of the subjects they are to teach, and skill in the different phases of handwork, but that they must know how to teach others the things they are learning, and to train others to do well the things they are trained in doing.

While the students taking these courses will have the benefit of a far better equipment than can be provided in most systems of schools, they are trained with reference to the development of power and skill in organizing and carrying on work under such conditions as to equipment as can be supplied easily in a village or city school system.

Through the munificence of Mr. Stout, means have been provided for carrying on various lines of experimental work in industrial education in a city system of schools. These lines of work will be continued, new experiments will be tried and the results of these experiments will be available for training school students. Theories will be tested before they are accepted as established bodies of educational doctrine to be given to training school students. The aim of the schools is to fit teachers to do well what has aready been proved to be worth doing, and at the same time to develop open mindedness and breadth of view which will lead them to consider, weigh carefully, test, and finally use what is valuable in the new.

A training school for the preparation of young women for the duties and responsibilities of the home was organized September, 1907.

GENERAL INFORMATION

LENGTH OF COURSE

COURSES leading to the diploma granted by each school require two years' work. Upon the completion of one of these courses,—Manual Training, Domestic Science, or Kindergarten,—a diploma is issued which, by statute, is made the basis for the issuance of a life certificate, after one year's successful teaching in Wisconsin.

This certificate legally qualifies the holder to teach the subjects in which training has been taken, in the public schools of the state. The certificate is issued by the State Board of Examiners and is accepted in most of the other states.

QUALIFICATIONS FOR ADMISSION

GRADUATION from a four years' high school course or equivalent preparation, will be required for admission to each of the training courses. The candidate must be at least seventeen years of age, and must be possessed of good health and physical energy, of refinement and good character. For admission to the Kindergarten Training Course some proficiency in both vocal and instrumental music is desired, although students are not denied admission because of lack of such proficiency. Students who have had no training in instrumental music must take private lessons before graduation. Testimonials of good character are required.

Students who have had Normal School or Collegiate training will be given credit for such work in the courses they pursue as they have satisfactorily mastered. Successful experience in teaching before entering the Training School, in most cases, reduces the amount of practice teaching required of the student.

GRADUATE COURSES

IN each of the schools a graduate course of one year is offered. These courses are planned to meet the needs of teachers who have had definite training, but who wish to take more advanced work, both technical and professional, than is offered in the regular courses. They furnish excellent opportunities for those who desire to prepare themselves to teach manual training, domestic art and science, or kindergarten and primary subjects in professional schools, or for supervising such work in city systems of schools.

ADVANCE ENROLLMENT

SCHOOL accommodations limit the number of students who can be enrolled; for this reason persons wish to enter, should make application in advance for an enrollment blank, which should be filled out and forwarded to the school with physician's certificate, and two certificates of good character. Enrollment will be made in the order of application.

THE DEMAND FOR GRADUATES

THE demand for the graduates of the Stout Training Schools as teachers and supervisors of manual training, domestic science and art, and of kindergarten and primary work comes from all parts of the country and

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is steadily increasing. They are now employed in twenty different states. During the school year 1907-1908 calls have come to the school authorities for more than one hundred teachers of manual training, a number far in excess of the supply.

The call for teachers of domestic science and art is greater this year than ever before, and the growing interest of the public in this work indicates a steady increase in the demand for some years.

The number of graduates from the kindergarten and primary training school has not been sufficient to supply the demand in any year since the school was organized.

Every aid which can properly be given by the officers of the school will be extended to graduates in securing positions.

SCHOOL EXPENSES

TUITION AND COST OF LIVING

ONE hundred dollars per year is charged for tuition, one-half payable at the beginning of each semester. A fee of ten dollars per year is charged to cover the regular cost of materials used by students in the Manual Training and Domestic Science departments. In the Kindergarten department students pay for whatever quality of material they care to get.

Board and room can be obtained at prices ranging from four and a half to five dollars per week—in private families.

BERTHA TAINTER HALL

ABOUT thirty young ladies can be accommodated in the Bertha Tainter Hall. The Hall is furnished with all modern conveniences, the rooms are electric lighted, and heated both by direct and indirect radiation, thus assuring ample heat and good ventilation. A large reception room, a reading and study room for those who may prefer to study there rather than in their rooms, and a music room, are provided.

The Hall, three blocks from the school grounds, overlooks Lake Menomin, and is in the midst of spacious, well-kept, well-wooded grounds. It is the aim to make this an ideal home for such students as wish to avail themselves of its accommodations. The home is in charge of a woman of experience and culture, and such regulations and supervision will be maintained as will insure proper conditions for health, effective work and the proper social life of students.

ADDITIONAL ACCOMODATIONS

IT is expected that a new building, accommodating forty young ladies, will be ready for occupancy at the opening of the school year in the fall of 1908. The same general plan of accommodation and management will be adopted as in Bertha Tainter Hall. As the call for accommodations is likely to tax the capacity of both halls, it will be necessary, in most cases, for two persons to occupy a room.

Room and board in either hall is $5.00 per week. For a few specially fine rooms, the charges may be $5.50 per week.

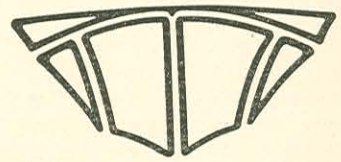
CALENDAR FOR 1908-1909

First semester begins September 21, 1908; ends February 5, 1909
Second semester begins February 8, 1909; ends June 17, 1909
Holiday vacation begins December 19, 1908; ends Jan. 3, 1909
Spring vacation begins April 2, 1909; ends April 10, 1909

Students should arrange to enter at the beginning of the school year if possible. When this is not feasible students may enter at the beginning of the second semester.

Address all correspondence regarding courses of study or general work of the Training Schools to

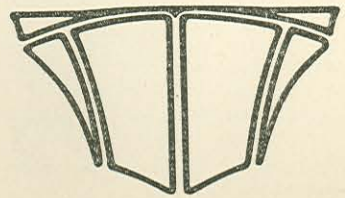
L. D. HARVEY,
Supt. Stout Training Schools,
Menomonie, Wisconsin.



SYLLABI OF COURSES

A GENERAL outline of regular courses offered for the preparation of teachers of manual training and domestic art and science, and detailed syllabi of a number of the courses are given with the idea: first, that there is a desire on the part of educational workers to know the character of work being given in training schools for special teachers; second, that teachers of these subjects and those responsible for the planning of special courses may become familiar with the purposes, courses of study, and methods used in the Stout Training Schools with the possibility of profit in their own work; third, that graduates of the Stout Training Schools, present students, and prospective students may have outlines of the courses given.

The outlines of courses here given are subject to such modification as experience may show to be desirable, without reducing the total time required for completing the courses.



MANUAL TRAINING SCHEDULE

For Outlines of Courses see pages following:

JUNIOR CLASS

FIRST SEMESTER

	Number of Periods per Week	Number of Weeks
Psychology	5	18
English	5	18
Manual Training Design	10	6
Elementary Woodwork	10	18
Joinery	10	12
Forging	10	18
Literature of Manual Training	5	9
Physical Training	4	18

SECOND SEMESTER

Mechanical Drawing	10	18
Thin Wood Construction	10	9
Paper and Cardboard Work	10	6
Bent Iron Work	10	3
Elementary Woodwork	10	18
Wood Turning	10	12
History of Manual Training	5	6
Physical Training	4	18

SENIOR CLASS

FIRST SEMESTER

Freehand Drawing and Design	5	18
Weaving and Basketry	10	3
Clay Modeling	10	6
Cabinet Making	10	18
Machine Shop Practice	10	18
Literature of Manual Training	5	9
Organization of Manual Training	5	9
Observation and Practice Teaching	6	18
Physical Training	4	18

SECOND SEMESTER

Mechanical Drawing	10	18
Machine Shop Theory	5	6
Machine Shop Practice	10	12
Pattern Making	10	16
Moulding and Foundry Practice	10	2
Hammered Metal, Pottery or Woodwork	10	18
Courses of Study in Manual Training	5	6
Observation and Practice Teaching	6	18
Physical Training	4	18

GRADUATE CLASSES

REQUIRED WORK

Manual Training Theory, Decorative and Structural Design, Advanced Mechanical Drawing, Practice Teaching.

SPECIAL STUDY

One of the following: Psychological and Pedagogical Aspects of Manual Training, Correlations between Drawing and Construction, Architectural and Machine Drafting, Furniture Design, Advanced Woodwork, Advanced Metalwork.

MANUAL TRAINING

HANDWORK FOR PRIMARY GRADES

PAPER AND CARDBOARD

PAPER and cardboard furnish opportunities for definite work particularly adapted to the lower grades. No rule measurements are used in the first grade; inch and half inch are introduced in the second grade; quarter inch in the third; eighths and sixteenths in the fourth.

FREE cutting, for first grade, trains in observation and imagination, and brings in the first use of scissors. Thin cover paper is cut and pasted upon heavier paper. (a) Pose of teacher or child or animal, (b) from photograph or drawing of people or animals showing action, (c) illustration of stories read or told to class, (d) representation of games showing children at play, (e) implements of trade as hammer or saw or shovel, (f) workman at some typical occupation.

CARD mounts and other single piece problems are introduced for each grade for the study of proportion and for drill in cutting to line. For the first grade,—the post card, photo mount, and bookmark are made; for the second grade,—a shipping tag, medicine glass cover, post card, and circle maker; for the third grade,—photo mount; for the fourth grade,—postal scale and time recorder.

MAKING booklets begins with folding, for first grade, which calls for first attempts to do accurate work. White or yellow drawing paper is made into folders of one fold, two fold, and three fold; folder with cover, octavo, duo decimo and 18 mo. booklets with tied covers; book of color schemes. For the second grade, sewed booklets for drawings, designs, receipts, and small records are made. For the third grade, booklets are sewed and glued for mounting clippings and illustrations.

BOOK binding for third and fourth grades follows the sewed and glued booklet. The first problem is the making of a small portfolio, then the making of a full bound book becomes a simple matter. Repair work, rebinding, and binding magazines and reports come next in order for practice.

ENVELOPES and paper sacks are made for the first grade by folding and cutting, and for the second grade by first laying out to measure. For the third grade a simple filing system is worked out with filing envelopes and cases for holding them. For the fourth grade, heavy envelopes, pocket paper files and larger paper files are made.

STRAWBOARD and pulpboard are used in making boxes for the second, third and fourth grades. Rectangular prisms are made from tag board for the first grade to introduce folding of lap joints and gluing corners. The second grade box has a lap joint, but introduces heavier material than the first grade. The third grade box has cloth reinforced corners. The fourth grade box is lined and covered.

CLAY MODELING AND POTTERY

AFTER the use of clay in modelling from objects, in representing forms of solid structure, and in the study of relief ornament, the time is given to building up small pieces of pottery.

USE of type forms for first grade includes: sphere and its application to apple or other spherical object, ellipsoid and lemon or pumpkin, modeling of various fruits, object based on rectangular prism, on triangular prism, pyramid cylinder, and cone. Modeling from fruits and common objects is planned for four grades.

MODELING from pose is planned for four grades, but most time is given to first grade pose work. In connection with this, animals are modeled from photograph for the first and second grades, houses and public buildings are modeled from memory and observation for the third and fourth grades.

RELIEF ornament is studied a short time for each grade, leaves and flowers being conventionalized upon a tile four inches square.

POTTERY is made the most important feature of clay work for primary grades. For the first grade, low dishes are built up from a flat piece of clay, with edges rounded at first and then made sharp; one entirely original shape is required. For the second grade, bowls are made by pressing the thumbs into balls of clay and working out; coiled work is also introduced here, and each student makes a rectangular dish, candlestick, flower pot, and fern dish. For the third grade, vases and decorated jars are built up with small lumps of clay. For the fourth grade, the student uses any method he cares to in making larger vases, tiles, and tea sets.

CASTING in plaster and throwing on a wheel are illustrated; talks are given on the character and use of clay in the class room; each student fires and glazes a part of his work.

Weaving and Basketry

THROUGH the use of paper strips, yarns, raffia, grasses, and rattan, the processes of interlacing materials to form various textile patterns and basket forms are illustrated.

WEAVING for the first grade, consists in making a plain yarn mat four inches square; for the second grade, a mat with border, six inches by nine; for the third grade, a rug nine inches by twelve, with simple pattern; for the fourth grade, a decorated rug nine inches by twelve. These are all made upon wooden looms six by nine and nine by twelve inches, using packing needles to carry the woof threads. Designs are all original.

BASKETRY for primary grades consists in making the following pieces: coiled mat, coiled basket, two or more different shapes of rattan baskets.

Thin Wood Construction

PROBLEMS in selecting, assembling, and fastening with glue and brads, strips of thin wood to form miniature pieces of furniture, boxes, and other small articles are given, with methods of class presentation and ways of preparing materials for class work; combinations of cardboard and wood are suggested.

HANDWORK FOR INTERMEDIATE AND GRAMMAR GRADES

Woodwork

EXERCISES involving the use of simple hand tools are presented in such a way as to prepare the student for teaching wood processes in elementary schools. The principles and practice of knife and bench sloyd, the possibilities of the art crafts, the suggestion of engineering and industrial problems, and the correlation with physics, mathematics, and art are all made bases for the course in wood.

The course is planned for students preparing to teach bench work in intermediate and grammar grades, from the last half of the fourth to the end of the eighth grade. The entire course is similar to the one taught in the grades of the Menomonie public schools, varying somewhat in consideration of the mental and physical differences of student and pupil.

The pursuance of the course means something more than the production of a series of carefully made models. The prospective teacher in this work should develop habits and powers of observation, scientific thought, mechanical executive ability, and a reasonable degree of rapidity.

The proper use of common and comparatively simple hand woodworking tools employed in the less difficult forms of constructive work is taught through the making of small articles, commonly termed models, which embody certain fundamental principles involved in the performance of properly sequenced exercises, each one growing out of one or more of the preceding exercises.

Working drawings are made for a part of the course, and the reading of drawings is an important feature throughout.

Fourth and Fifth Grade Woodwork

WORK for the grades below the sixth, is planned to prepare the student for the limited conditions under which the work must be taught, both on account of the meager equipment and the immature mental and physical powers of the pupil. The principles are taught and the exercises performed in such a manner as to directly prepare the pupil for later work.

The work performed with the pencil, sloyd knife, try square, back saw, coping saw, small plane, chisel, bit, file, skew carving knife, and background punch, may be simplified by substituting certain models, and eliminating the use of the plane and other equipment. The course outlined requires the use of all the tools mentioned above.

The stock is, with a few exceptions, prepared in thickness before it is given to the pupil so that the dimensions of length and width only are considered. The last few models require consideration of thickness. In addition to the regular models, articles involving combinations of the constructive processes, are designed and made by students.

1. Name plate,—straight edge and cross grain cut.
2. Key label,—boring hole, sandpapering.
3. Plant marker,—diagonal cuts.
4. Cord winder,—double diagonal cuts.
5. Shipping tag,—convex cut.
6. Match scratcher,—diagonal and convex cuts.
7. Pencil sharpener,—difficult diagonal cuts.
8. Mariners' compass,—bevel cuts.
9. Fish line winder,—difficult cross grain and diagonal cuts.
10. Paper file,—gluing and nailing.
11. Box,—assembling and nailing.
12. Bird house,—use of coping saw.
13. Worsted winder,—making ellipse with string, use of background punch.
14. Key rack, use of compass.
15. Tooth brush-holder,—countersinking.
16. Bracket shelf,—difficult use of coping saw.
17. Post card box,—chip carving.
18. Box with cover,—assembling and nailing of projecting bottom.
19. Cart,—making of spindle on axle and driving screws.
20. Optional model.

Woodwork for Upper Grades

WORK designed for the sixth, seventh and eighth grades is planned for a room with an equipment of woodworking benches and tools. It teaches the use of the common forms of hand saw, the method of "squaring up" stock with the plane, the making of various cuts with the chisel, the handling of the spoke shave, marking guage, brace and bit. It deals with different forms of simple joints, ways of fitting and fastening in wood construction, and methods of finishing and polishing. A regular sequence is planned for about five-sixths of the course and opportunities are given for the making of additional articles designed by the student and suitable as models in these grades.

SIXTH GRADE

1. Bill file,—squaring up of stock, bevel planing, and boring.
2. Bread board,—broad surface planing, guaging, chiseling, and sand papering.
3. Coat hanger,—cutting with turning saw and spoke shave, filing.
4. Drawer pull,—gouging and scraping.
5. Handkerchief box,—assembling of parts, nailing, setting of nails, simple carving.
6. Water wheel,—countersinking, simple sheet metal cutting and beating, back sawing, metal filing and fitting.

SEVENTH GRADE

1. Straight edge,—careful squaring up of stock, beveling.
2. Broom holder,—boring with large auger bit, paring with the chisel, filing, sandpapering.
3. Blotting pad,—chiseling broad curved surface, boring and countersinking for screw and assembling of parts.
4. Flower pot stand,—cross-lap joint.
5. Book stall (simple form from original design),—simple squaring and hinge fitting.
6. Towel hook (hard wood),—chiselling, spoke shaving, and sandpapering a free curved form.
7. Sleeve board,—boring holes with expansive bit, locating and boring dowel holes, making and fitting plug.

EIGHTH GRADE

1. Ruler,—careful squaring up of stock, and laying off divisions with knife.
2. Pen tray,—broad beveling, gouging, scraping and sandpapering in groove.
3. Tool holder,—chisel gaining, bit boring, assembling and fastening by means of screws.
4. Letter box,—long and shallow gaining, rounding of edges, assembling, nailing, and setting of nails.
5. Picture frame,—corner half-lap joint, rabbeting, clamping, and gluing.
6. Tabouret,—dowel joint, cross lap joint and fastening by means of screws.

Materials and Types of Construction

IN connection with this course in woodwork a course in materials and types of construction is given. The general purpose and plan of the course is to acquaint the manual training teacher with the nature of materials and processes in such a way that the knowledge thus acquired may serve to enliven and enrich a manual training course.

MATERIALS which are common and much used in the industrial world receive most consideration. A portion of the time is devoted to the building of miniature objects to represent types of construction in which these materials are used, and the rest to a study of the origin, locality, method of obtaining, processes of manufacture and uses.

All students are required to prepare themselves by reading, observation or other means, upon the subjects assigned for a given lesson, and some one student designated previous to the time for the lesson, to present the subject before the class.

Various forms of construction work are assigned to different members of the class.

Students are required to submit notes, references and sketches. From these selections are made and compiled and a copy of the same furnished each member of the class.

Bent Iron and Sheet Metal

A KNOWLEDGE of the properties of metals as differing from other structural materials may be obtained in the grammar grades through the manipulation of thin iron. The principles of constructive and of decorative design are considered in each model.

THE regular models are the grille exercise or mat, mail receiver, hammered tray, fern dish, candlestick, lantern, bracket, chain, Warren bridge truss and Pratt truss, and other types of structure. Original designs are required for the decorative problems. Supplementary free work is also required.

Pottery and Cement

THE elementary pottery for primary grades is continued into more advanced work in the making of decorated pieces for upper grades.

FERN boxes, soap and match holders, pitchers, sugar bowls or tea pots, large jars and vases are made. The preparation of clay for class use, the moulding and decorating of pottery, the placing and firing of the kiln, and the use of glazes form the principal part of the work. Wheel work and casting in plaster are explained and opportunity furnished for individual practice.

THE work in cement includes a study of the properties of the different compositions, and the making of arches, bridges, piers, walls, and tiles on a small scale.

WOODWORKING FOR SECONDARY SCHOOLS

Joinery

JOINERY is planned for the first year's work in the high school and is governed in its arrangement by the difficulty of tool operations. The laying out, or drawing of the lines on the stock, previous to most of the tool work, while a comparatively simple process, is of primary importance.

ALL exercise pieces in joinery must vary less than one thirty-second of an inch in accuracy of dimensions. The laying out process and tool operations must be methodically and correctly performed and the finished product have a neat and workman-like appearance. The tools must be kept in a perfect cutting condition. The important processes involved in each exercise, is indicated after the name of the exercise piece.

1. Planing exercise,—"squaring up" stock to required dimensions.
2. Sawing exercise,—making saw cuts at acute and compound angles to the surface of the stock.
3. Chiseling exercise,—cutting grain parallel with, and at different angles to the grain.
4. Butt hopper joint,—difficult laying out process, simple tool operations, parts held together with screws.
5. End-lap and end-lap mitre joints (joints made on opposite ends of stock),—laying out process and method of splicing, joining or assembling parts.
6. Cross-lap joint,—impressing the importance of depending on and using the working face and working edge, the joined pieces of unequal width and thickness.
7. Keyed and bolted scarf or spliced joint,—the careful fitting, wedging and bolting together of the parts.
8. Mortising exercise,—cutting a series of different sized and shaped holes, square, oblong and triangular; some are cut entirely through, and others part way through the stock.
9. Through mortise and tenon joint,—a wide oblong hole with perfectly parallel cheeks or sides into which is carefully fitted a tenon; the purpose and method of wedging and keying a tenon explained.
10. Haunched mortise and tenon joint,—consideration of the size of a tenon relative to its use in construction. Laying out mortise and tenon off center; locating, boring and inserting draw pin.
11. Half blind dovetail,—a study of the proper size and angular form of the pins. Laying out of the pins and their use as a templet in marking the location of the sockets; tool operations in forming pins and sockets.
12. Dowel joint,—the use of the dowel pin in fastening plain butt joints.
13. Rabbet and fillet joints,—the use of an angular recess. The method of using a fillister and rabbet plane.
14. Groove joints,—matching by plowing, grooving, splining, feathering, and tongueing; the use of the plow plane and match plane.

The piece or pieces constructed in which certain of the outlined exercises are applied is left largely to the choice of the student; the instructor naming those exercises which have in their performance a particularly valuable experience. The following named articles are sometimes used as class or group models:—screen, chair, filing drawer, table and a minature bridge, the latter to illustrate the proper disposition of material from the standpoint of strength.

Wood Turning

PREPARING for pattern making and introducing power machinery, wood turning is given for second year high school classes. Attention is given to: correct position of the body, the manner of holding the tools, their correct use and degree of sharpness, dangers and necessity for continuous attention to work.

THE course consists in making a series of exercise pieces in soft wood which give a familiarity with wood turning tools and lathe operations, followed by a series of finished pieces in hard wood which bring in center turning and face plate work, fitting, chucking, and polishing. Students are required to take proper care of lathes and tools, and to observe the application of those principles necessary for the successful teaching of wood turning. The course follows:

1. Cylinder,—roughing and reducing to required diameter with large gouge.
2. Cylinder,—reducing to required diameter and length with paring tool.
3. Double cone,—reducing to dimensions with paring tool.
4. Step cylinder,—sizing with paring tool.
5. Cylinder with "V" grooves,—paring tool.
6. Cylinder with circular grooves,—gouge.
7. Beaded cylinder,—paring tool.
8. Compound curve and fillet,—paring tool, gouge and parting tool.
9. Face plate exercise,—face plate with screw center.
10. Boring exercise,—face plate and square edge chisel.
11. Fitting exercise,—reversing in chuck.
12. Vase with enlarged interior,—special tool.

The applications consist of spindles, chisel handles, vise handles, police and Indian clubs, dumb bells, gavels, mallets, saucers, vases, goblets, napkin rings, torus forms, and spheres.

Pattern Making

WORK in pattern making gives an acquaintance with methods of construction used in this branch of wood work and the considerations necessary to successful moulding. The rules for draft, shrinkage and methods of preventing irregular crystalization of cast metal are explained and applied, and the importance of constantly considering the moulding process is also impressed upon the students. The method of applying and the reason for using different kinds and colors of varnish are explained.

FOLLOWING the name of the exercise piece is an explanation of the principles and operations involved:

1. Shoe,—draft, makes its own core.
2. Wrench,—irregular parting line.
3. Bolt,—two piece pattern, lathe work, allowance for machining.
4. Crank,—temporary securing of parts by using glue and paper; seating of turned parts.
5. Round stake for hammered metal work,—lathe and fillet work.
6. Pipe coupling,—simple core box.
7. Flange,—core box with irregular outline.
8. Pulley,—"built up" work to prevent warping.
9. Grooved pulley,—turned core box.
10. Valve,—complicated core box.

Wood Carving

EXERCISES in wood carving are first presented which form a sequence of practice pieces in soft wood. These practice pieces are planned so as to develop a facility in handling the carving tools, and give an acquaintance with the different cuts involved in grooving, in sinking the background, and in modeling concave and convex surfaces.

THE exercises begin with straight and are followed with curved line designs for units of ornament upon a square piece of board. The carving of small panels in hard wood, which follows the exercises, is applied as a decoration to cabinet constructions made by the student. Different kinds of treatment adapted to geometrical designs, conventionalized natural forms, and naturalistic elements are illustrated.

Graduate Woodwork

OPPORTUNITY is furnished for those taking advanced work who wish to do extra work in cabinet construction, wood carving, wood turning, or patern making, in order that they will be able to handle these subjects with greater efficiency.

METALWORK FOR SECONDARY SCHOOLS

Hammered Metal Work

HAMMERED metal work is adapted to high school classes where time can be put upon the art crafts. Copper and brass sheets of varying thicknesses are the materials most used. Sheet sterling silver of several gauges will be on hand for students who wish to do extra work. Attention is directed to the making of good forms, good workmanship, and suitable decoration and surface effects. The first pieces are planned for schools with limited equipment and these are followed by more difficult pieces requiring additional equipment.

1. Saucer,—hammered against a block of wood, edge turned over against block of iron.
2. Low dish,—hammered into a hole in a block of wood, projecting edge surface marked.
3. Tray,—with reponse decoration.
4. Bowl,—started in a hole, finished over a stake.
5. Name tag,—sawed, strap slit, letters in relief.
6. Watch fob,—sawed and engraved.
7. Electric light shade,—pierced decoration, riveted joint.
8. Hinged box,—riveted corners, hinge and fastenings made to design.
9. Heavy bowl,—raised over a stake.
10. Small jar,—soldered rim, fitted cover.
11. Decorated bowl or jar,—etched design.
12. Inlaid plate,—silver and enamel work.

Silver spoons and small dishes, jardiners, library and den fittings, and various applications of the exercises involved in the first twelve models are designed and worked out.

Molding and Foundry Practice

FOUNDRY work demonstrates the necessity for carefully considering draft, shrinkage, machining, and coring in the making of patterns. The three ways of molding with different kinds of sands are explained, and work is done in the green sand process in moulding and casting from certain of the patterns made in the pattern making course. Words and terms peculiar to the work are used and explained.

THE actual work includes the use of the follow and bottom boards, two and three part flasks, and common tools, the making of gates, running vents, core making and setting, and the heating and pouring of the metal. Four perfect castings are required from patterns involving the greatest variety of molding processes.

FORGING

THE course includes a description of appliances with explanation of their operation and a consideration of the uses and care of different tools and materials used in forging. The necessary processes of working iron, and steel, as,—drawing, forming, upsetting, bending, welding, hardening, tempering and annealing, are taught together with their applications in practical and ornamental forging. The basic operations of forge practice are taught through the making of the following exercises, and in the construction of the following models:

1. Drawing out exercise,—cutting, heating, manner of striking, drawing.
2. Ring,—bending over horn of anvil.
3. Angle,—bending, upsetting corner.
4. Bolt and nut,—upsetting, heading, cutting, punching, thread cutting.
5. Bracket,—shaping curve, drilling, riveting.
6. Welded ring,—scarfing, bending, welding.
7. Ring hook,—fullering, drawing, swaging, punching, splitting, heading, bending, welding.
8. Bolt and ring,—welding, thread cutting, working double piece.
9. Hook and chain,—welding, shaping.

The remainder of the course in iron forging is devoted to the making of ornamental pieces designed and drawn by the individual students. The pieces involve processes or modifications of processes which have been illustrated in the foregoing exercise work and include:

10. Poker; 11, shovel; 12, tongs; 13, andirons.

The working of steel is taught through the discussion of the properties of steel and a comparison of the difficult kinds, and through the making of the following steel tools:

14. Cold chisel.
15. Center punch.
16. Threading tool (lathe).
17. Right side tool.
18. Left side tool.
19. Boring tool.
20. Center drill.

An important feature of the course is the requirement that each student shall do some practical work in the way of repairing equipment or keeping the tools and appliances of the shop in good condition. The purpose of this is to give a training in shop management that will aid the student in solving problems that will come up in his later work as a shop instructor and manager.

MACHINE SHOP PRACTICE

OUTLINED below is the course now given to the senior class of the training school. The series of exercises with the processes or operations each one is intended to teach is described. The problem is to teach as many fundamental and typical processes as possible in a very limited time.

The primary object is to teach the student a correct or systematic method of thinking out the problem at hand, that is, of planning and attacking the work before him. This is why the course consists largely of exercises, of no value whatever as finished pieces of work. As the school shop cannot have more than one drill, planer, shaper, milling machine, and grinding machine, it is impossible to do each exercise in the exact order described.

1. Taper turning exercise, cold rolled shafting,—centering ends, punching, drilling, and countersinking, facing ends with side tool, cutting cylinder with straight shank tool holder and right hand cutter, adjusting tail center, if necessary, measuring with micrometer caliper; making convex and concave cuts with right and left hand cutters, finishing curves on the speed ltahe; making cuts with threading tool; turning number two Morse taper by setting over tail center to given formula, testing in sleeve; knurling and polishing parts indicated; drawfiling taper.

2. Thread cutting exercise, machinery steel,—turning to dimensions, grinding threading tool cutting right and left hand threads, testing on a nut; cutting double or triple threads for supplementary work.

3. Hexagonal bolt and nut, drop forged steel,—turning shoulders of head, finishing bolt to size, grinding threading tool to fit U. S. standard thread gauge for the required pitch, cutting threads to fit nut, finishing sides of head and nut on milling machine or shaper.

4. Double eccentric, cast iron,—taking rough cuts in chuck, locating three centers on each end, turning nearly to size, filing and polishing on the speed lathe.

5. Lathe center, round tool steel,—facing ends, turning cylinder to size, turning taper with use of spindle, finishing taper on grinding machine, turning point to sixty degrees in spindle, tempering center, finishing point on center grinding machine.

6. Fitting exercise, cast iron and round machinery steel,—chucking, centering, facing top, boring with boring tool, reaming, finishing on mandrel; cutting inside and outside threads (cast iron), cutting key way in jig on shaper, cutting threads on shaft close to shoulder, milling key way in shaft, making key; making work fit a half thousandth of an inch under size, snug fit a quarter thousandth under size, drive fit a half thousandth over size, shrunk fit four to six thousandths over size.

7. Jack screw, body and step of cast iron, screw of cold rolled machine steel, lever of octagon tool steel,—mounting body on face plate, centering, boring, reaming, cutting threads with inside square threading tool and finishing with a special square thread tap; plugging hole with wood, bringing up tail center, and finishing outside; chucking, centering, boring and reaming the step, finishing and polishing on a mandrel; turning machinery steel to size, grinding and setting threading tool and cutting four threads per inch; drilling holes for lever with screw in box jig; centering, turning, polishing, and bending lever; mounting whole jack screw between centers and finishing base, fastening step to screw by upsetting top of screw with flat punch; filing, cleaning and polishing; painting parts not machined.

8. Shaper exercise, cast iron,—chipping, filing and scraping one face, testing on surface plate; finishing other faces on shaper, locating and drilling holes, tapping and counterboring; chipping, filing, and polishing rectangular hole.

9. Planer exercise, cast iron,—clamping work, square and angular planing. (The planer exercise is taken as a class problem.)

10. Gear, cast iron,—chucking, boring, and reaming blank, forcing on mandrel with arbor press, turning blank to correct width and diameter, polishing, cutting gear teeth on milling machine.

11. Stand of gears, cast iron, and machine steel,—cutting gear teeth as in preceding exercise, finishing stand on shaper, locating holes for studs, drilling holes, making studs of machine steel, making running and drive fits.

12. Construction of simple machine, making of extra pieces of exercise work, repairing broken parts of machine tools.

MACHINE SHOP THEORY

LECTURES, demonstrations and discussions of topics related to the machine shop practice make up the theoretical side of the course. The purpose is to give an acquaintance with the conditions of machine shop work necessary in a manual training or trade school.

TOOLS AND SUPPLIES

EXAMINATION of reference books, catalogs, and circulars for necessary information in selecting and purchasing machine tools, small tools, and general supplies.

THEORY OF CUTTING TOOLS

RAKE, front clearance, side clearance; setting of tool for different diameters; clearance of side tool; clearance and setting of boring tool; tools for turning brass, parting or cutting off tools; ad-

vantage of tool-holders with high speed steel cutters; disadvantages; forged and special formed threading tools; chattering; advantage of goose-neck tools; hand tools; special formed tools.

CUTTING FEEDS AND SPEEDS

DEFINITIONS; method of finding cutting speed, revolutions and diameter being given; finding time to take given length of cut, feed and revolutions being given.

TAPER TURNING

MORSE tapers; Brown and Sharpe tapers; other tapers; when used; taper per inch; per foot; in degrees. Methods of turning tapers,—

(a) Setting over of tail center.
(b) Use of compound rest.
(c) Use of taper attachment.
(d) Taper turning lathe.

Boring tapers, cutting taper threads, using formula for finding amount of set-over of tail center for given taper; derivation of formula; setting of tool for taper turning; testing taper.

DIMENSIONS AND FORMS OF THREADS

SHAPES of the following threads are discussed:

(a) Sharp V thread.
(b) U. S. Standard thread.
(c) Square thread.
(d) Acme or 29 degree thread.
(e) Brown and Sharpe 29 degree worm thread.
(f) Whitworth or British standard.
(g) Metric standard.
(h) Buttress thread.
(i) Right and left hand threads.
(j) Single, double, triple and quadriple threads.

Pitch, lead, turns per inch.
Formulas for sharp V thread.
Formulas for U. S. Standard thread.
Formulas for square thread.
Formulas for acme or 29 degree thread.
Formulas for Brown and Sharpe 29 degree worm thread, Buttress, Whitworth, metric threads.

THREAD CUTTING

FUNCTION of lead screw and change gears; right and left hand threads; selecting change gears; use of index plate; fractional threads; modern quick change gear lathe.

THREADING TOOL

SHAPE of tool,—grinding; use of center gauge; no top rake; where to measure angle; setting of tool.

OPERATION of cutting the thread; —use of stop; swivelling compound rest 30 degrees; cutting threads on old Putnam lathe; Le Blond lathe (chasing dial); Lodge and Shipley lathe; Hendey-Norton lathe (stops); resetting tool after grinding; why tool will not travel back in same path.

MEASUREMENT OF THREADS

EXTERNAL or male threads; internal or female threads; fitting threads; testing with tapped nut; measuring threads with caliper, with thread micrometer, and with wire; use of thread gauges; formulas for pipe threads; cutting double, triple and quadruple threads; difficulty in cutting clearance of tool.

TAPS AND DRILLS

TAPER, plug, bottoming taps, taps for different kinds of work; dies; relieving of teeth; size drill to use for given size tap; clearance allowed; use of tables; machine screw and letter size drills.

Clearance of twist drills,—backing off; increase twist; constant angle; methods of holding drill in chuck; speeds and feeds; drills for different kinds of work; grinding by hand and in drill grinder.

GEARING

SPECIAL reference is made to what can be accomplished with the average high school class; spur, bevel, worm and spiral gears; involute and epicyclordal systems; Brown and Sharpe's method of drawing tooth outline; definitions of terms used, and simple problems in spur gearing; selection of cutters.

GEAR CUTTING

CUTTING spur gear on universal milling machine; method of centering cutter, indexing, inaccuracies; automatic gear cutting machine; Fellows gear shaper; Bilgram and Gleason bevel gear planers.

GRINDING AND GRINDING MACHINES

ADVANTAGES of grinding; selection and use of grinding wheel; speeds and feeds; methods of keeping work cool; small amount that can be ground off.

Different types of grinding machine; crank grinding machines; taper and internal grinding; cylinder grinding machines.

Cutter grinders; methods of holding cutters and reamers; different shaped wheels to be used; other uses of cutter grinder.

MACHINE EQUIPMENT

STUDY of cost and adaptability of different machine tools suitable for school shops; machines and number of each necessary, desirable; small tools required; fixtures included or not included with machine tools by the manufacturer.

ERECTING AND INSTALLING

LOCATION of line shaft and countershafting; setting of machine tools; thickness and width of belting required.

ADVANCED METALWORK

GRADUATE students may elect to do advanced work in the machine shop in making and assembling parts of machines, or special work in hammered metal and enameling.

DRAWING AND DESIGN

FREEHAND DRAWING

PRACTICE is given in drawing from flowers, from pose, from parts of machines, and from photographs and drawings, to develop an ability to use the pencil and chalk readily in representing mechanical constructions and decorative elements. A few sheets of copy work are introduced to develop technique and an ability to express exactly what one sees. The principles of design are explained and each student makes drawings to illustrate these principles.

THE rectangle as an area is studied. It is divided by vertical bands, and variations are then made as to width of bands, distance between them, number of bands, and arrangement of light and dark areas. Other rectangles are divided by crossing bands and variations made as in the first exercise. Others are divided by border bands, and still others by small inner rectangles. After each series of sketches a selection is made and used as a basis for lines of emphasis in a finished drawing of a box, cabinet, or other manual training model. The possibilities of slanting bands, triangular and rhomboid forms are next worked out in the same manner as that of the rectangular forms. A more abstract study of the principles of design as applied to the rectangle is made and worked out with several examples.

FOLLOWING this is a study of different kinds of lines, applications being made to free non-rectangular forms and also used as decorative ornament. Geometrical curves, such as the ellipse, spiral, involute, hyperbola, and parabola are drawn and the strength of line used in outlines of models calling for this kind of work. Natural forms are sketched and used in construction design. Lines are copied from various sources and varied in many ways.

LEAVES and flowers are conventionalized and fitted to different shaped areas. Units of ornament are studied as used by different peoples and for various purposes. The limit of adaptibility of types of design to types of construction is constantly pointed out. Throughout the course the use of design to enhance structural features rather than to hide them is kept clearly in mind.

TYPES of structure are examined, considering the necessities of particular materials and forms of fastenings. The considerations are made the basis of a series of designs of practical problems.

Principles of Design

IN connection with the Freehand Drawing, lectures are given on the principles and practice of design, with suggestions for its handling in public school classes.

Students are referred to Lucy Crane, "Art and the Formation of Taste;" Denman W. Ross, "A Theory of Pure Design;" and Arthur W. Low, "Composition." A part of the course is an interpretation of these three books. For the teaching of design, students are referred to Jas. P. Haney, "Classroom Practice in Design."

APPROPRIATENESS

1. A design must be appropriate to the use of the construction.
2. Materials of construction must be carefully considered.
3. A design should show the type of construction and usually emphasize the important joints.
4. All designs should be considered in relation to their ultimate surroundings.

ESSENTIALS FOR DESIGN

5. There must be obvious elements of unity in a design.
6. Variety must be added in such a way as not to destroy the unity of the design as a whole.
7. To bring two unlike elements together in a design some transition device containing qualities of both unlike elements may be introduced.

PURE DESIGN

8. The Order of Harmony necessary to all designs refers to "recurrence or repetition, * * * correspondence or likeness" in position, line, area, or tone.
9. The Order of Balance refers to "equal opposition and consequent equilibrium."
10. The Order of Rhythm refers to movement in a design with "equal or lawfully varying intervals and measures."

COMPOSITION

11. The quality of line, or character of boundaries must be given most careful attention, both in the drawing and in the execution of the problem.
12. "An interrelation of parts out of which a single unit comes" is expressed by the word "synthesis."
13. We may disregard principles of arrangement, but we cannot violate them.

APPLIED DESIGN

14. Principles must be related to practice in design.
15. Outlines of constructions should receive first consideration.
16. Parts of constructions must be fastened properly.
17. If ornamentation is to be used it must be given a proper setting, but it must not detract from the interest in the structural features.
18. Design for paper and cardboard; for textiles, baskets, and leather; for stone, clay, cement, and glass; for wood; and for metal; each has its special difficulties and possibilities.

Manual Training Design

TYPICAL problems in paper and cardboard, weaving basketry and leather, wood, ceramics and metals are worked out in pencil, pen and ink, and wash. Full sequences of models for courses of study in the different materials are planned for assigned grades.

History of Art and Design

A SERIES of lectures on the development of the arts accompanies the course in Manual Training Design.

References: Ruskin, Two Paths on Art; Rosengarten, Architectural Styles; Hamlin, History of Architecture; D'Anvers, History of Art; Binsted, Useful Details in Several Styles; Midgley and Lilley, Plant Form and Design; several books on principles and practice of design: The Craftsman Magazine: The School Arts Book: Deutsche Kunst und Dekoration' Dekorative Kunst.

FOLLOWING are the topics covered:

1. The historic development of architecture and decoration.
2. Historic styles in furniture.
3. Pottery and metal work of various peoples.
4. European tendencies in design.
5. The art crafts movement.
6. American tendencies in design.

Decorative and Structural Design

DESIGN work of a somewhat different nature is required from graduate students. The work presupposes adequate preparation in freehand and in mechanical drawing. The aim is to present the necessities of structure for different materials and uses as a basis for design, to show the application of principles of design to different types of construction, and to indicate ways of teaching applied design in manual training classes in public schools. The work is an elaboration of the manual training design given in the regular courses. Emphasis is laid upon a high quality of drawings made to illustrate the successive topics.

Graduate Drawing and Construction

FOR those taking graduate work who expect to teach freehand drawing and design as well as constructive drawing and shop work, opportunity is furnished for charcoal, pen and ink, pencil, and water color representation and design, and suggestions given as to the planning of a correlated course in the manual arts.

Graduate Furniture Design

GRADUATE problems in furniture design and interior decoration are given with a consideration of structural elements in their best proportion; followed by applications of the panel and the curved line. A part of the work includes a study of applied ornament. All drawings are dimensioned and finished with a carefully executed wash.

Junior Mechanical Drawing

A COURSE of drawings is given that will enable students to acquire, (a) proficiency in the use of instruments, (b) knowledge of the conventions and methods in drafting room practice, (c) acquaintance with elementary geometrical constructions, (d) an understanding of orthographic projection and development, and (e) the making of working drawings.

THE first five drawings made are in pencil and are suggestive of a course in constructive drawing for the seventh and eighth grades, where the instruments used are few and simple and the theory of projection is not explained.

1. Exercise sheet,—lines, lettering, dimensioning.
2. Geometric solids; cube, triangular prism, hexagonal prism, hexagonal pyramid, with dimensions.
3. Working drawing of broom-holder, copied.
4. Working drawing of book rest, outline copied, placing of dimensions worked out by student.
5. Working drawing of taboret, original.

The remaining drawings are finished in ink and are suitable for high school classes.

6, 7, 8, 9, 10, Exercise sheets,—full lines; dotted lines; letters, figures, sections; circles, tangents; irregular curves, spiral.

11, 12, 13, 14, Geometrical constructions.

15. Projection parallel to projection planes.

16. Projection at angle to projection planes.

17. Projection and development of truncated prism.

18. Projection and development of truncated pyramid.

19. Development of intersection of two cylinders.

20. Intersection of cylinder and cone.

21. Projection of conic sections.

Manual Training Equipment

IN connection with the Junior Mechanical Drawing equipments are planned for manual training classes. The aim is to enable students to solve some of the problems that must be considered in planning, equipping, and maintaining a manual training room or building in an efficient and economical manner under any special set of conditions.

The work is carried on through lectures, required reading, class discussions, and the making of plans and drawings of buildings, rooms and fittings, and the working out of specifications and costs of tools, supplies, and general equipment. Following are the problems taken up and the topics considered:

1. Fitting up a woodworking shop in a public school building.
2. Planning a manual training building to meet special needs.
3. Arranging benches and machines in the various shops.
4. Designing the following to be built or fitted up in the school:
   - General tool closet.
   - Lumber storage room.
   - Finished model closet or cabinet.
   - Tool panel.
   - Joinery bench with drawers or tool rack.
   - Blue printing apparatus.
   - Drawing table.
   - Cabinet for drawings.
   - Rack for iron and steel stock.
5. Selecting general equipment from dealers.
6. Selecting tools for the various shops in building previously planned (see Bulletin of the Stout Training Schools, August, '06).
7. Estimating costs of tools and equipment in various shops (see Bulletin S. T. S. August, '06).
8. Selecting tools and supplies from dealers; reliable dealers in manual training supplies; the best sources,—manufacturer, wholesale dealer, and local firms.
9. Estimating costs of materials used in various subjects (see Bulletin S. T. S. February, '07, and May, '07).

Senior Mechanical Drawing

DRAWINGS suitable for high school classes are presented in such a way as to meet the demands upon teachers in those schools which aim to prepare their students for higher technical schools, for machine drafting, or for architectural drafting, and in those schools which desire to give a general course in mechanical drawing.

THE course includes: (a) advanced work in projection, and perspective; (b) machine details and assembly drawing; (c) architectural details and plans; (d) working out a course in mechanical drawing.

1. Letter sheet for use as title page.
2. Sheet of drafting conventions.
3. Projection, framed prism at double angles.
4. Projection of boat curves.
5. Location of points upon irregular solid.
6. Drawing, lesson plan and demonstration of problem in projection suitable for second year high school class,—original.
7. Shadow of irregular solid,—test problem.
8. Perspective at angle to picture plane.
10. Projection of perspective scheme.
11. Topographical perspective.
12. Perspective, chair and table, different angles.
13. Perspective of cast shadows,—test problem.
14. Development of helix and application in V and square threads.
15. Conventional threads, bolt and nut.
16. Heart cam and irregular cams.
17. Stand of gears, working drawing.
    Tracings and blue prints.
18. Details of machine parts.
19. Assembly drawing of machine.
20. Floor plan of frame building.
21. Construction details of building.
22. Elevations of building.

Graduate Mechanical Drawing

PROJECTION and perspective drawing in their various phases are taken up thoroughly and some of the more difficult geometrical problems are also worked out. Methods of work having the most general application are kept to the front, but alternate methods and checks are continually pointed out. The aim is to develop an ability to handle easily the high school work in drawing, to be able to solve any drafting problem that is likely to arise, and to see the application and value of technical ability acquired.

THE following indicates the scope of work:

1. Intersection of sphere and cone.
2. Intersection of two cones.
3. Perspective of house with cast shadow.
4. Perspective of cylindrical, conical and spherical solids.
5. Cycloids and trochoids.
6. Approximate involutes.
7. Involute gearing, single curve.
8. Involute gearing, double curve.
9. Bevel gearing.
10. Detail measured machine drawing.
11. Assembly machine drawing,—from details.
12. Construction details of panel, door, drawer, shelving.
13. House framing details.
14. Stair details.

Architectural and Machine Drafting

FOR students taking graduate work who desire to specialize along the lines of either architectural or machine drafting, an opportunity is given to become acquainted with the general conditions underlying each of these fields. Detail drawing, planning and assembling each has a place in the course.

ARCHITECTURAL DRAFTING

THE heating, lighting, plumbing and ventilating of a modern dwelling is studied through assigned reading, lectures, and the making of diagrams; a study of the different orders of architecture and lessons in architectural design, architectural principles including room arrangement and conveniences, a comparison and criticism of different house plans with regard to cost, provisions of specifications, etc., and a short review of laws governing building and sanitation preparatory to the making of complete plans, and working details, specifications and estimates of cost of a modern two story frame dwelling.

The principles of brick, stone, cement and steel construction are taken up and drawings made of types of construction that will involve the use of one or more of these materials.

MACHINE DRAFTING

ELEMENTS of machine design are taken up and a study made of steam or gasoline engine drawing, electrical machine parts, machine tool construction, etc., in such a way as to enable teachers to carry out shop problems in the making of patterns and machining and assembling of parts for such machines, according to modern shop theory and method.

PROFESSIONAL WORK

Psychology and Pedagogy

WORK in psychology and pedagogy is taken at the beginning of the junior year and is limited to a consideration of principles, fundamental in character, and to the application of these principles in the actual work of teaching. Time will not permit the study of psychology as a culture subject. The students who have so studied it, but have not given consideration to the application of its fundamental principles in teaching, will need to take the prescribed course.

SPECIAL attention is given to the psychology of attention, habit, and will. Those principles of pedagogy are considered which may be shown to have a practical application in the teacher's work. In the academic, shop, and laboratory work, it is the aim of the teacher not only to have students master the special work under consideration, both from the academic and the technical standpoints, but at the same time to consider the work from the standpoint of the teacher. Practical exercises are given throughout the course, requiring a conscious application by students in their work of the psychological and pedagogical principles studied.

Observation of Teaching and Practice Teaching

DURING the senior year the students are required to systematically observe the work of experienced teachers in conducting classes in their respective lines of work in the public schools. The observation work is under the direction of members of the training school faculty. The observation required is not simply a "looking on;" the teachers in charge direct the attention of the observers to definite aims, methods, and results.

METHODS of different teachers in the instruction and control of classes are studied, not to be copied, but to determine how far they are based on sound pedagogic principles. The work under observation is discussed by those observing and the teachers in charge of the observation classes. Weaknesses are pointed out and the reasons for the weakness shown from a pedagogic standpoint. The strong work is noted and the reasons for its strength discussed. The aim is to make students familiar with the application of psychological and pedagogical principles through a careful observation of the various ways in which these principles are applied by different teachers in different phases of the work. After the observation work has been continued for a reasonable time, students are put in charge of classes and are given practice in teaching in different grades. Before beginning practice teaching in any grade, students are required to thoroughly familiarize themselves with the work outlined in the course of study for that and lower grades and by observation of the class, to determine what progress has been made in the course and what are the next steps in order. Before taking charge of the classes, they are required to prepare definite plans indicating the proper order of procedure. The practice teaching is done under the supervision of the special teacher of the particular line of work in which the instruction is given. In the class work of the regular teachers in the training schools, an effort is made to bring into the consciousness of the students the pedagogical principles upon which the work there is based.

Organization and Management of Manual Training Classes in Public Schools

BY means of lectures, discussions, essays and written reports, the aims and practices concerned in carrying forward a complete course in manual training for city schools are considered. The first consideration for the teacher of any special branch is to determine the specific educational doctrine which is to be the foundation of his teaching. Problems should be chosen which contain proper disciplinary value and at the same time give a fund of usable knowledge. The content of manual training courses depends to an extent upon the industries of a community, the full scope involves many considerations to be discussed in this course. The work of the manual training teacher as an organizer, as a teacher and as a supervisor is outlined and many features of the work developed at length.

EDUCATIONAL AIMS

1. Study of educational theory.
2. Formulation of educational creed.

SCOPE OF MANUAL TRAINING

3. Vocational function of school handwork.
4. Content of manual training.
5. Kinds of schools handwork desirable.
6. Training in habits and attitudes.
7. Adjustment of sequence in exercises.
8. Acquaintance with industrial environment.
9. Elementary and secondary school problems.
10. Cultural and practical features.
11. Hand and eye training for efficiency.

ORGANIZATION OF MANUAL TRAINING

12. General information and first considerations.
13. Relations between special and regular classes.
14. Conditions of regular school organization.
15. Plans for equipment and course of study.
16. Records, reports, and filing conveniences.
17. Exhibitions, lectures, and printed matter.

TEACHING OF MANUAL TRAINING

18. Determination of purposes and subject matter.
19. Unit and day lesson plans.
20. Methods of teaching manual training.
21. Testing and drilling in drawing and construction.
22. Preparation for lecture and demonstration.
23. Individual, group, and class instruction.
24. Definite requirements in handwork.
25. System in handling classes.
26. Familiarity with educational literature.

SUPERVISION OF MANUAL TRAINING

27. Laying out courses for others to teach.
28. Selection of teachers; relation to superintendent.
29. Teachers meetings,—conference, instruction, criticism.
30. Visits to classes,—regular and special.

History of Manual Training

AIMS of the historical survey are: (a) to trace the adjustments of the schools to changing social needs, (b) to interpret educational theory thus developed, (c) to follow the growth of the manual training movement, (d) to get a broad view of education and of manual training.

1. Scope of course as a whole.
2. Early educational theory and practice.
3. History of the changes in educational ideals.
4. Educational leaders of recent times.
5. Recent educational tendencies.
6. The industrial tendency in education.
7. Growth of manual training in the United States.
8. Growth of manual training in Europe.

Junior Literature of Manual Training

A THOROUGH study is made of the three following important books dealing with the basic principles of manual training:

Salomon,--The Teacher's Handbook of Sloyd.
Woodward,--The Manual Training School.
Sickels,--Exercises in Woodworking.

Along with this text-book work, supplementary reading of industrial reports is carried on. Every student is required to analyze and review each of the books, and discuss vocational and training values of school handwork.

Senior Literature of Manual Training

THE importance to the student of manual training of an acquaintance with its literature is made the basis of a study of available material covering the different aspects of the subject.

Oral and written reviews are required of books containing matter pertaining to the industrial aspect of education, books dealing directly with manual training, magazine articles relating to public school handwork, and published reports of associations. Such books as the following are representative of the scope of work:

SLOYD SYSTEM

Salomon, Theory of Educational Sloyd.
Salomon, Teachers' Handbook of Sloyd.
Hoffman, Sloyd System of Woodworking.
Larsson, Elementary Sloyd and Whittling.
Larsson, Sloyd for Upper Grammar Grades.

TECHNICAL PROCESSES

Woodward, Manual Training.
Ham, Mind and Hand.
Goss, Bench Work in Wood.
Crawsnaw, Problems in Furniture Making.
Ross, Elementary Course in Woodwork.
Purfield, Wood Pattern-Making.
Bacon, Forge Practice.
Woodworth, Hardening, Tempering, Annealing and Forging of Steel.
Leonard, Machine Shop Tools and Methods.
Vandervoort, Modern Machine Shop Tools.
Woodworth, Grinding and Lapping.
Ashley, Practical Planer Kinks.
International Correspondence School Text Books:—Strength of Materials, Applied Mechanics, Machine Design, Masonry, Carpentry, Joinery, Pattern-Making, Molding, Core-Making, Cupola Practice, Machine Shop Practice.

ARTS AND CRAFTS

Sanford, Arts Crafts for Beginners,
Rose, Copper Work.
Wilson, Silver Work and Jewelry.
Cockerell, Bookbinding and the Care of Books.
Frederick, Plaster Casts and How They are Made.
Rowe Practical Wood-Carving.
Todd, Hand Loom Weaving.
White, How to Make Pottery.
Tinsley, Practical and Artistic Basketry.

MECHANICAL DRAWING

Mathewson, Notes on Mechanical Drawing.
Edminster, Architectural Drawing.
Tracy, Mechanical Drawing.
Kennedy and Norton, Notes on Engineering.
Willson, Theoretical and Practical Graphics.

DESIGN

Ross, Theory of Pure Design.
Dow, Composition.
Midgely and Lilley, Plant Form and Design.
Bacheldor, Principles of Design.
Haney, Class Room Practice in Design.
Brown, Letters and Lettering.

GENERAL

IN addition to the above lists, the school libraries are well supplied with books on tool processes, manual training practice, and educational theory, and new books are being constantly added. All of this material is available for students taking this course.

ARTICLES IN MAGAZINES

BESIDES the study of books, the following magazines are examined:

Manual Training Magazine.
School Arts Book.
Craftsman.
Technical World.
Deutsche Kunst.
Dekorative Kunst.
Educational Review.
Teachers' College Record.
Bulletin of the Stout Training Schools.

Other magazines on file in the department are used for reference material.

EDUCATIONAL REPORTS

THE following reports of associations and governments are studied:

Council of Supervisors of the Manual Arts.
Eastern Manual Training Association.
Western Drawing and Manual Training Association.
National Educational Association.
State Educational Reports.
United States Department Reports.
Reports from Foreign Countries.

Courses of Study in Manual Training

BY means of a study of manual training exercises, sequences, and general practices as indicated in school catalogs and circulars, and after becoming familiar with the recent history of manual training and its diverse aims in different localities a course of study is planned for public schools involving a variety of materials and processes, and yet with a continuous aim and carefully graded steps. The practicability as to teaching in public school classes is made an important element in determining the value of any educational scheme of hand work.

Manual Training Theory

RESEARCH and experimental study of the more important aims of educational hand work and of the general practice in public schools, is offered to graduate students.

In connection with the public school classes of the city of Menomonie, where a thorough course in manual training, from the kindergarten through the high school, is given, opportunity is offered for a systematic observation of all phases of constructive work and drawing.

Psychological and Pedagogical Aspect of Manual Training

CONDITIONS of mental growth and the effects of definite hand work upon these conditions form the background for a study of nerve structure and action, habit, the relation of physical to mental training, the relationships between mental traits, the adaptation of manual training problems to pupils of different interests and abilities, and social aspects of industrial art work. Conferences and reports on assigned readings will be the preparation for a final theme which will treat fully one of the foregoing topics.

GENERAL

English

PRESENTATION of such phases of composition work as will give the student a command, both in speaking and writing, of simple, correct and clean-cut English, is the aim of this course. The

special topics considered vary with the needs of particular classes, but in general they may be designated as: grammatical forms; sentence structure; choice of words; social and business correspondence; the preparation and organization of literary material.

The work is closely correlated with that in other departments and is based on long and short themes, talks, discussions, and papers presented by members of the classes.

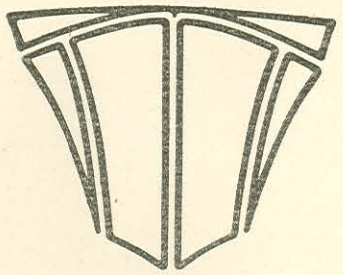
A special feature of the work in English is the training in oral exposition and description. The tools and materials used, processes employed, and products completed in the construction work furnish many of the topics for these exercises. This work is continued throughout the course for the purpose of developing ease, facility, and accuracy in the students' subsequent use of English as a teacher in the class-room.

Electives

ELECTIVES in literature, or work selected in the domestic art and science courses, or in drawing, will be taken the equivalent of one hour daily throughout the course. In the selection of electives, students will be expected to advise with and secure the approval of the director of the training school.

Physical Training

REGULAR work in the gymnasium will be taken throughout the course unless students are excused by the director for cause.



DOMESTIC SCIENCE SCHEDULE

FOR OUTLINES OF COURSES SEE PAGES FOLLOWING

JUNIOR CLASS

FIRST SEMESTER

	Number of Periods per Week	Number of Weeks
English	5	18
Psychology and Pedagogy	5	18
Mechanical Drawing	3	18
Inorganic Chemistry	6	18
Food Study	5	18
Sewing—Model	4	18
Cooking	6	18

SECOND SEMESTER

Physiology	5	12
Home Nursing and Emergencies	5	6
Freehand Drawing	6	18
Organic Chemistry	6	18
Food Study	5	18
Sewing—Model	4	18
Sewing—Plain	3	18
Cooking	4	18

SENIOR CLASS

FIRST SEMESTER

Household Management	5	18
Biology	6	14
Physics	6	4
Dressmaking	6	18
Millinery and Art Needlework	4	18
Textiles	2	18
Cooking	6	18
Household Decoration (optional)	10	18
Observation and Practice Teaching		18
Cardboard Construction (optional)	4	18

SECOND SEMESTER

Dietetics	4	12
Organization and Management	4	6
Physiological Chemistry	7	18
Food Adulterations	2	12
Dressmaking	6	18
Millinery and Art Needlework	4	18
Cooking and Serving	6	18
Household Decoration (optional)	10	18
Observation and Practice Teaching		18
Primary Handwork	4	18

GRADUATE CLASSES

Science, Dietetics and Dressmaking, Professional Work, Interior Decoration and Home Furnishing.

DOMESTIC SCIENCE COURSES

Food Study

THE purposes of the course in food study are: (1) to give a knowledge of foodstuffs that will lead to intelligent selection, combination and preparation of food in the average home; (2) to give an idea of the relation of the home as a factor in consumption to the world of production and of business; (3) to give a full and systematically arranged scheme for food study that will furnish the teacher who must arrange a course of study available information without the necessity for collecting it from various sources of information.

That these purposes may be realized it is necessary that the subject of food and food materials be considered from the following viewpoints, what constitutes a food, food compositions, digestion and ease of assimilation, classification and combination, the specific value of food materials of various kinds; the industrial aspect of food production including the factors that influence food value, appearance, and cost; and the actual preparation or cooking and serving.

It is necessary also that this subject-matter be classified in some systematic manner, that authorities used in preparation of material be cited, and that the results of the work be permanently recorded.

THE following course of study will give the general scope of the work. One or two topics worked out in full will show the method of organization.

The preparation and serving of foods are considered under the subject of cooking.

THE CELL 1. Definition. 2. The single cell. 3. The cell existing in tissue.
A study of the cell as a basis for understanding cell nutrition in the organism.

THE ORGANISM AS DEVELOPED FROM THE CELL 1. Single cell. 2. Tissue. 3. Organs. 4. Systems. 5. Organism.

THE CELL IN THE HUMAN BODY 1. Kinds. 2. Nutrition. 3. Special functions.
A study of food requirements in the body must be based upon a knowledge of the way in which the various cells of the body grow, form foods, excrete wastes, and store excesses.

FOOD 1. Definition.
2. General processes through which it passes in being used by the body.
3. Classification according to chemical composition.
   a. Organic.
      Nitrogenous or proteid. 1. Composition. 2. Kinds or classes. 3. Functions.
      Non-nitrogenous. 1. Composition. 2. Kinds or classes,—fats and carbohydrates; composition, classes, functions. 3. General functions.
   b. Inorganic.
      Mineral salts,—kinds and functions. Acids. Water.

FOOD IN THE BODY

1. Digestion—a brief study of the organs of digestion, digestive juices, action of digestive juices.

2. Proteids.
   (a) Compositions, reviewed.
   (b) Physical properties influencing digestion.
   (c) Digestion, action in each organ of digestion.
   (d) Absorption, where and how.
   (e) Circulation, in what form.
   (f) Assimilation, conversion of various elements into tissue, secretions, heat, and energy.
   (g) Excretion, of wastes as water, urea, carbon-dioxide.
   (h) Storage, of excessive foods as muscle fats, muscle sugar, and adipose tissue.
3. Carbo-hydrates. Considered in same way as proteids, discussing sugars and starches separately.
4. Fats. Same as above.
5. Mineral substances and acids.
6. Water.

FOOD STUFFS

The various materials found in the market must be studied with reference to obtaining a usable knowledge of the preceding material that the purpose of the study may be accomplished. That this may be done the following general classification is used and food materials are grouped as cereals, vegetables, nuts, fruits, meats, milk, eggs, condiments and spices, and the various products derived from these natural materials.

1. Composition and Structure,—physical and chemical.
2. Digestion. 3. Food Value. 4. Botany. 5. Distribution.
6. Cultivation. 7. Manufacture. 8. Transportation and Storage.
9. Cost. a. Factors entering into cost. b. Actual cost. c. Comparative cost.
10. Selection. a. Appearance. b. Season. c. Cost. d. Uses to which food is to be put.
11. Influence of preparation. a. Upon palatability. b. Upon appearance. c. Upon food value.

THE following topics, rice and beef, are given to illustrate method of organizing subject-matter. These topics are sub-topics of the larger subjects, cereals and meats, each of which is considered in a general way that there may be a comparative knowledge of the different points under the main heads. This gives ability to make substitutions in selection.

RICE--A CEREAL

1. Composition and Structure.
   a. Physical, oval white grains, large starch cells easily hydrated, cellulose easily broken up.
   b. Chemical, C. H. 76%, P. 7.5%, F. .5%, M. M. .5 Water 14.6%, Fiber .9%.
2. Digestion.
   Starch making up larger per cent. of composition is digested principally in intestines.
   Proteid is readily digested, very available, fat easily digested and does not interfer with digestion of other foods.
3. Food Value.
   Absorption very complete, rich in heat and energy production, poor in tissue building, well adapted to diet for hard labor and extreme physical exertion.
4. Botany.
   Annual grass, long linear leaves, seeds in loose head, seeds covered with husk. Varieties: Upland and lowland rice, etc.
5. Distribution.
   Warm parts of Asia, Africa, Ausrtalia, and America. Used in warm climates by one-third of world's population. Best rice produced in Carolinas and Japan.
6. Cultivation.
   Discussion of Japanese and American methods of cultivation, including sowing, transplanting, flooding, cutting, binding, drying, threshing, and milling.
7. Manufacture.
   Into flour, breakfast foods, spirituous liquors, beverages, starch, glue, used with flours rich in gluten, used as adulterant in many ways.

8. Transportation and Storage.
   In gunny sacks from mills. Shipped to jobbing house or sectional mills where it is sorted, polished, and put up in sacks, packages, kegs, and tin cans, for marketing and transportation. Is not injured by storing, improved by being stored at least six months.
9. Cost.
   Ease of cultivation and wide distribution make it an inexpensive food. Ease of transportation and storing qualities make it an available food to widely distributed peoples. Compared with other cereals it may have a slightly higher market value, but considering food value the actual cost is not great in comparison.
10. Selection.
    Japanese rice usually richer in proteid than American; upland richer than lowland; clear, translucent kernel indicates good quality; broken rice has same food value as more expensive large kernels if cooked in such way that it does not loose minerals and starch.
11. Preparation.
    Considered under cooking.
12. Bibliography.
    Authorities used in preparation of work.

BEEF--A MEAT

1. Composition and structure.
   a. Physical; bundles of muscle fibres composed of fibrils bound together by connective tissue, fat deposited as adipose tissue or suet, bones, tendons and gristle.
   b. Chemical; general composition.
   P. 19.5 %.
   F. 9.7%.
   M.M. 1.4%.
   Water 69.4%.
   Muscle fibrils are made up of sheaths of gelatinous material enclosing soluble albumens, minerals, and extractives.
   Connective tissue, tendons, gristle are made up largely of gelatinous material.
   Bones contain gelatin, mineral salts, water, extractives, and fats.
2. Digestion.
   The proteids of beef are comparatively easy of digestion, the connective tissue being easily dissolved and the albumen liberated. The fat being largely a salt of stearic acid, is hard and does not interfere in the stomach with the digestion of other foods as is the case with some fats. The length of time required in digestion varies with the method of cooking from two to three and one-half hours.
3. Food Value.
   Absorption is more complete than in many meats. Because of the flavor and availability beef may be used throughout the year, making it a standard article of diet.
4. Distribution.
   Marketable beef is raised in nearly all sections of the temperate regions and is obtained in the market through local dealers and through the large centers of supply, the packing houses. This makes it a uniform and stable product with a fairly uniform and well sustained price.
5. Growth and Marketing of Beef.
   This involves brief discussions of the methods of putting beef onto the market and a more detailed discussion of packing house processes.
6. Transportation and Storage.
   Discussions of refrigeration, hanging of beef, food laws governing storage and transportation, influences of the above upon cost.
7. Cost.
   Wide distribution does not lower cost of beef as might be supposed from the law of supply and demand, the cost being more or less arbitrarily fixed by centers of supply. The quality of beef and whether supplied by local markets will make a slight variation in the average price. Compared with other meats it has a slightly higher market value, but considering its food value and all around use, it is less expensive than other meats.
8. Selection.
   a. Appearance of good beef.
   The lean should be bright red in color, elastic, loose fibred, streaked with fat. The fat should be cream-colored, hard, crumble easily, should have no deposits of blood.

   b. Cuts of Beef.
   Fore quarter; neck, chuck ribs, cut ribs, cross ribs, shoulder, breast, shin, plate.
   Hind quarter; loin, consisting of porterhouse cuts, tenderloin, and sirloin, rump, round, shank, flank.
   c. Season.
   In season from January until December.
   d. Cost.
   The cost varies with the cuts of meat. In the main fore quarter cuts are cheaper than hind quarter cuts.
   e. Uses to which beef is to be put.
   In selection, the method of preparation will govern the choice of the cut of meat to be used, some cuts requiring long cooking at low temperature, others short cooking at high temperature.
9. Preparatton.
   Methods of preparation considered in cooking.
10. Bibliography.
    Authorities used in preparation of work.

PHYSIOLOGY

AIM: (1) To teach the structure of the human body and the functions of its various organs, with special reference to the physiology of nutrition and the maintenance of a healthy organism; (2) to teach a sytematic arrangement of the subject-matter, and the organization of a course of study in physiology which will be adapted to eighth grade and high school pupils; (3) to show the best methods of presentation in teaching physiology.

THE following outline shows the scope of the work and the main subjects considered. Each subject is worked out in detail in a manner similar to the one given.

HUMAN BODY COMPARED TO A STEAM ENGINE
GENERAL STRUCTURE OF THE BODY
STUDY OF THE AMOEBA
INDIVIDUAL CELL IN THE BODY
FOOD NECESSARY FOR THE CELLS

A STUDY OF BLOOD MANUFACTURE
1. Digestion. 2. Digestive juices. 3. Absorption from alimentary canal. 4. Metabolism. 5. Hygiene of digestion.

A STUDY OF THE BLOOD
CIRCULATION OF THE BLOOD
1. Organs of circulation. 2. Systems of circulation.

LYMPHATIC SYSTEM
SKELETON
1. Study of bones. 2. Study of joints.

MUSCLES
1. Voluntary. 2. Involuntary.

RESPIRATION
SKIN
KIDNEYS
NERVOUS SYSTEM
STUDY OF THE SENSES
1. Touch. 2. Taste. 3. Smell. 4. Sight. 5. Hearing.

VOICE AND SPEECH

A STUDY OF BLOOD MANUFACTURE

DIGESTION consists of a series of changes taking place in the alimentary canal by which food is made ready to become a part of the blood.

1. Organs of digestion.
   A. Alimentary canal.
      (a) Mouth: parts, lining,
         1. Teeth: kinds, structure, composition, use, care.
         2. Tongue: structure, functions.
         3. Salivary glands: location, structure.
         4. Saliva: ingredients, use, production.
      (b) Pharynx: shape, parts.
      (c) Esophagus: structure, position, action.
      (d) Stomach: position, size, shape, structure. Gastric glands: structure, position, function.
      Gastric Juice: composition, function.

(e) Small intestine: position, size, structure, function.
Villi: structure, function.
Digestive juices: composition and function of each.
(f) Large intestine: position, size, structure, function.

B. Pancreas.
Position, shape and size, structure, function.

C. Liver.
Position, shape and size, structure.

2. Digestive juices.
Name of each, where secreted, composition, function.
3. Steps in digestion.
Mastication, insalivation, deglutition, stomach digestion, intestinal digestion.
4. Absorption from alimentary canal.
Meaning of term, principle of osmosis, absorption from different organs.
5. Metabolism.
6. Hygiene of digestion.

DIETETICS

THE course in dietetics has for its purposes: (1) to give an understanding of the relation of the study of physiology, physiological chemistry, food study, food chemistry, and food preparations to the preparation of the diet for the various normal conditions that exist in the family and for the preparation of invalid dietaries suited to the diseases that are ordinarily cared for in the home; (2) to give a logical development of the subject that will furnish a basis for more advanced study and investigation to any who wish to specialize in dietetics; (3) to give an organized arrangement of the subject-matter that will be useful to the teacher of dietetics or to the domestic science teacher who must combine the teaching of dietetics with the study of food and food material; (4) to show the relation of this subject in a course of study to such lines of work as chemistry, physiology, and biology, to show methods of presenting the subject-matter to pupils, ways of relating dietetics to the ordinary course of instruction in food study and cooking, importance of a knowledge of dietetics in general education.

THE course of study which follows shows in a general way the content of such a course of instruction. For convenience in arrangement the subject may be divided into four divisions; foods, physiology of foods, food in health, and food in disease.

FOODS

This phase of the subject will consist of a review of food study and food chemistry with a more detailed working out of the relation of the two than has been given before.

1. Classification of food principles.
Composition, general digestion, use in the body.
2. Foodstuffs.
Composition of the common foodstuffs, proportions of food elements, digestibility, assimilation, amount of waste, amount of heat and energy produced, effects of preparation upon the general character of materials.

PHYSIOLOGY OF FOODS

A review of the physiology of nutrition in this case precedes the more specific and analytical work in physiological chemistry.

1. Composition of human body, tissues, organs, and secretions.
2. Food necessities of body, elements necessary to supply needs, sources of supply.
3. Food in the body.
a. Digestion, the composition of each digestive fluid and its action upon the different food elements.
b. Absorption, the form in which each digested food material is absorbed, organs of absorption.

c. Circulation, courses of circulation, character of circulating foods, modifications in course of circulation due to metabolism and elaboration.
d. Metabolism, the use of food and oxygen in the production of tissue, heat and energy, and wastes.
e. Excretion, the composition of wastes, organs of excretion, processes of excreting.
f. Food storage, superfluous foods stored as glycogen, adipose tissue, muscle fat, and sugar.

FOOD IN HEALTH

Variations of food in health must conform to peculiar physiological conditions and to environment. These conditions may be due to age, habit of life, occupation, climate, or season as well as to personal idiosyncrasy, which must always be taken into account.

1. Diet as influenced by age.
a. Infancy; peculiar physiological conditions, modification of food to suit conditions, manner and amount of feeding, habits of feeding.
b. From two to six years.
Same as above.
c. From six to twelve.
d. From twelve to sixteen.
e. From sixteen to twenty-two.
f. Mature life.
g. Middle life.
h. Old age.
2. Diet as influenced by habit of life, occupation, etc.
a. Diet for young school children.
b. Diet for mature student.
c. Diet for sedentary occupations.
d. Diet for vigorous physical occupations.
e. Diet for outdoor life.
3. Diet as influenced by climate and season.
a. Diet for cold climate and seasons.
b. Diet for warm climate and seasons.
c. Modification of diet from warm to cold and vice versa.

FOOD IN DISEASE

Diseases commonly treated in the home are grouped as nearly as possible according to their dietetic treatment.

a. Diseases of the stomach.
b. Diseases of the intestines.
c. Diseases of the circulatory organs, derangement of blood.
d. Diseases of the liver.
e. Diseases of the kidneys.
f. Diseases of the nervous system.
g. Fevers, special diet independent of cause of fever.
h. Colds, influenza, etc.

Two of the general topics given above are worked out in detail to show the method of organization. The diet of the school child is taken as a representative of diet in health because of its importance in the development of a strong body; the diet suitable for some stomach disorders is considered as an example of diet in disease.

DIET FOR SCHOOL CHILDREN

1. Conditions peculiar to school life.
Lack of exercise and pure air, cramped position, infrequent meals, over-crowding and overheating of rooms.
2. Physiological conditions.
Rapid development of tissue, little stored food material, frequent atrophy of cells because of this, stimulation of circulation of blood to head, extreme nervous tension, sluggish digestion.
3. Food necessities to meet needs.
Rich blood carrying only substances that can be used, wastes should not accumulate, food should quiet rather than excite, should stimulate circulation that supply of blood to brain and stomach may be equalized.
4. Foods suited to diet.
Easily digested and stimulating proteids, sugars in pure form for immediate absorption, starches for sustained nutrition, warm nutrious fluids as soups for stimulating circulation, some fruits for sugars others for stimulating acids. All combinations of fats and carbohydrates in pastry and the like should be avoided, as should all rich heavy food and most concentrated foods.

DIET IN STOMACH DISORDERS

1. Structure and function of stomach.
2. Character of fluids secreted for stomach digestion.
3. Abnormal physiological conditions.
a. Organic, diet in organic disease is seldom corrective or curative, it should not aggravate disease, but can not cure it.

b. Functional.
   1. Caused by insufficient supply of blood to stomach, insufficient secretion of digestive fluids, incorrect proportioning of constituents of fluids, presence of poisons such as ptomaines and leucomaines, results of continued fever, overloading stomach, incorrect habits of eating, poor selection of food materials.
   2. Corrected by eliminating indigestible foods, by thorough mastication of foods, by regular habits in eating, by selection of food material giving necessary chemical substance to system, by such preparation of food that it may be as helpful to the body as it is possible for it to be.

Following this study of conditions and necessities dietaries suited to various diseases of the stomach are selected and prepared. The actual preparation of foods is carried on in invalid cookery.

Cooking

FOR convenience in arrangement the course in cooking may be divided into three subjects, plain cooking as conducted in the junior year, cooking and serving as conducted in the senior year, and invalid cooking. While it is impossible to classify all of the work under these three heads, this arrangement will give an idea of the lines of work conducted in each year of training. The training value of the three lines of work and the professional aims are nearly the same, the practical purposes differing with the subject.

Plain Cooking—Junior Year

THE following purposes govern the organization and conduct of this course of study: (a) to teach the scientific principles underlying food preparation and their practical application; (b) to teach the correct preparation of the simple foods in ordinary use in the home; (c) to develop skill and judgment in the use of materials and utensils; (d) to teach the relation between food study and food preparation and use; (e) to develop correct ideals of neatness, order, care of materials and kitchen, correct combination and preparation of food, wise and economical use of time, energy, materials, and fuel; (f) to aid in the formation of habits that will lead to the realization of these ideals; (g) to teach the essentials in the selection and purchase of materials and equipment in the home and school kitchen; (h) to show the development of the subject as teaching material and its adaptation to school purposes; (i) to show methods of presentation and possibilities of attaining mental and physical development.

In order that these varied purposes be realized, it is necessary that the kitchen laboratory work be directed along two lines, the actual preparation, or cooking, and the care of the room and its furnishings, or housekeeping. In all of the work the student is made responsible for the care and arrangement of the working rooms.

The following topics give an idea of the sequence of the work:

1. Prepartion of food principles.
   (a) Experiments in action of various agents upon proteids, carbo-hydrates, and fats.
   (b) Application in the simple cooking of eggs, rice and cornstarch, bacon and butter.
2. Methods of cooking.
   (a) Uses of dry and moist heat; baking, boiling, frying, steaming, etc.
   (b) Application in simple cookery, as the application of baking and boiling the potato.

3. Cooking of carbo-hydrate foods.
   (a) General statement of purpose in cooking.
   (b) Changes due to use of dry and moist heat and of other agents.
   (c) Preparation of sago, tapioca, rice, cereals, starchy vegetables; methods of preparation being chosen that do not necessitate combination with proteids.
4. Cooking of fatty foods. Treatment same as above.
5. Cooking of proteid foods. Treatment similar to above.
6. Cooking of plain foods of various kinds.

In each case the preliminary preparation of food principles is used to show method of preparation, additional principles such as the use of leavening agents being introduced when necessary to an understanding of the subject.

(a) Batters; proportions, handling of materials, method of cooking of the common batters.
(b) Doughs; same as above.
(c) Cereals; method of cooking, combination with other materials.
(d) Beverages; proportions, method of cooking.
(e) Soups; cream, puree, stock.
(f) Meats; beef, veal, mutten, lamb, pork.
(g) Poultry and game; chickens, turkeys, ducks, birds, etc.
(h) Eggs; use as thickening agents, as leavening agents, as food in itself.
(i) Vegetables; fall, winter, spring.

The following topic is developed to show method of conducting work:

BATTERS DOUGHS, ETC.

1. Proportions.
   (a) For thin or pour batter.
   (b) For drop batter.
   (c) For doughs.
2. Methods of leavening.
   (a) Mechanical process; beating air into batter, beating air into eggs and then into batter.
   (b) Chemical reaction; use of soda and an acid, use of baking powder.
   (c) Plant growth; use of yeast, leavening due to action of wild yeasts.
3. Manipulation of materials.
   (a) Sifting and mixing of dry material.
   (b) Stirring to combine ingredients.
   (c) Beating to make light.
   (d) Kneading; to make light, of even texture, to combine materials.
   (e) Rolling; to make thin sheet of dough, to roll air into dough.
   (f) Lightening of doughs before baking; development of carbonic acid gas, expansion of gluten and albumen cells.
   (g) Baking to set gluten and albumen cells; temperature for various batters and doughs, length of time of baking, tests of oven and finished product.
4. Application in making of waffles, batter cakes, breads, cookies, simple cakes, etc.
5. Care.
   (a) Of materials before using.
   (b) Of food after it is cooked.

Cooking and Serving, Senior Year

COOKING in the senior year is conducted in the same manner as the cooking of the junior year with a difference in the practical applications. The foods prepared are more elaborate in composition and preparation, though no effort is made to take up fancy cooking. Attention is directed to food combinations and the correct service of foods, and to marketing with reference to cost of materials and to returns in food value.

1. Food preparation.
   Preparation of cakes, pastry, salads, ices and ice creams, puddings, fancy desserts, fruit preservation, and the various foods used in the average home not included in the junior cooking.
2. Garnishing and decorating.
   (a) Of foods, salads, desserts, etc.
   (b) Of table and dining room, preparation of place and menu cards, etc.
3. Serving of meals.
   (a) Lunches at a given cost.
   (b) Luncheons, breakfasts, and dinners.
   (c) Meals of ceremony, dinners, high teas, banquets, refreshments for various entertainments.

The meals served are planned by the students, the materials purchased, the food prepared, and all details of garnishing and decorating as well as serving supervised by students.

Invalid Cooking

AIM: (a) To teach the proper preparation and the best methods of serving food for the sick, also diet in special diseases; (b) to teach the methods of presenting the subject.

The course includes the preparation of the following foods:

1. Gruel,—barley, oatmeal, arrowroot.
2. Broth,—beef-tea, mutton, chicken.
3. Soup,—cream soups, orange, prune.
4. Beverages,—tea, coffee, cocoa and chocolate, lemonade, orangeade, toast-water.
5. Eggs,—poached, egg in a nest, egg nog.
6. Sandwiches, and scones,—raw beef.
7. Toast,—dry, milk.
8. Jellies,—lemon, prune.
9. Boiled rice with apple compote.
10. Koumiss.

Home Nursing and Emergencies

AIM: (1) To teach the practical treatment of simple ailments of the human body and the methods of handling simple emergencies that may occur in the home, school or elsewhere; (2) to teach the best methods of presenting the subject to pupils.

As far as possible, practical application is made of the instructions given.

The scope of the work includes the following topics:

1. Sick room,—location, furnishing, ventilation, care.
2. Beds and bed-making.
3. Lifting and handling the patient.
4. Baths and bathing.
5. General observations,—temperature, respiration, pulse.
6. Medicines and their administration.
7. Local applications,—plasters, poultices, blisters and other counter-irritants, compresses—hot and cold.
8. Contagion and disinfection,—infectious diseases; modes of propagation, fumigation.
9. Emergencies, — fainting, drowning, scalds and burns, frost bites, hemorrhage, nose bleeding, sprains and fractures, poisoning, antidotes.
10. Bandaging.
11. Study of a few special diseases,—consumption, typhoid fever, indigestion, sore throat, biliousness, dypepsia.

General Science Courses

COURSES in science here outlined are not designed to give the student a comprehensive knowledge of the fundamentals of the subjects studied and are not detailed science courses in the ordinary sense of the word. Only such phases of the various lines of work are dwelt upon as have an application in practical home management and

such fundamentals are taught as are necessary to an understanding of these applications.

The aim in teaching is not professional, but to give a basis for practical work and to show the relation of the sciences to practical matters in the home.

General Inorganic Chemistry

INORGANIC chemistry is given for such phases of the subject as are essential to an understanding of food chemistry rather than to familiarize students with all the fundamentals of general chemistry. The following topics are the principle ones studied:

1. Matter,—kinds, changes, properties, forms, elements, compounds, mixtures.
2. Chemical reactions,—definition, conditions superinducing, characteristics, quantitative aspect.
   (a) Laws of conservation of mass.
   (b) Definite proportions.
   (c) Multiple proportions.
   (d) Chemical equations.
3. Water.
   (a) Composition. By volume, determination of gas volumes, laws of Boyle and Gay Lussac. By weight.
   (b) Properties, — chemical and physical.
   (c) Solution,—kinds, states, circumstances affecting, characteristic, application of theory of electrolytic dissociation.
   (d) Purification,—boiling, filteration, distillation, chemicals, oxidation, city purification.
4. General outline.
   (a) Elements,—metals and non-metals.
   (b) Compounds.
   Metallic and non-metallic oxides.
   Bases,—nomenclature, definition in terms of ion theory, formation, reactions.
   Acids,—nomenclature, definition, reactions.
   Salts,—nomenclature, definition, formation, reactions.
5. Atomic theory.
6. Determination of atomic weights.
   Determination equivalent, molecular weights, deduction of atomic weights.
7. Valence.
8. Periodic law of the elements.

Food Chemistry

FOOD chemistry is essential to the understanding of food materials and the reactions which occur in their preparation for use. The course is planned to give this scientific basis for the practical work and to emphasize the essential materials by the analysis of a complete food. The course is conducted by means of lectures, recitations and laboratory work.

1. Carbon compounds.
   (a) Hydrocarbons.
   Alliphatic series, paraffines, olefines, acetylenes, derivatives of paraffines, such as alcohols, ethers, aldehydes, ketones, esters.
   Aromatic compounds, benzene series, derivatives of benzene.
   (b) Carbohydrates.
   Monosaccharides, hexoses—mannose, dextrose, levulose, galactose.
   Disaccharides, sucrose, lactose, maltose.
   Polysaccharides, starches, gums, cellulose.
   (c) Fats.
2. Nitrogen compounds.
   (a) Proteids considered according to Webster—Koch classification.
   (b) Alkaloids.
3. Mineral compounds.
4. Proximate analysis of milk, ash, moisture, fat, carbohydrate, proteids.

Food Adulterations

FOLLOWING the course in food chemistry, this course is considered an important adjunct to it. The object is to give the student information concerning the common adulterations and the foods in which they most frequently occur. Whenever possible household tests which may be used in any kitchen are given for the detection of adulterations.

1. Classes of adulterants,—preservatives, coloring matter, substitutions, artificial essences, mineral compounds.
2. Foods commonly adulterated,—milk, butter, olive oil, lard, sugar, syrups, flour, baking powder, canned products, ketchups and sauces, fruit extracts.
3. Testing foods for different adultrants.

Physiological Chemistry

PREREQUISITES to this course are the ones in food chemistry and physiology. The aim is to show the chemical reactions of the foods within the body and the results of these reactions.

1. Human system.
   - (a) Gross structure.
   - (b) Internal structure, respiratory organs, alimentary canal, circulation of blood and lymph.
   - (c) Cell, structure, composition, necessary foods.
   - (d) Tissues and secretions, blood, muscles, fat, bones, various fluids.
2. Food required by the body.
3. Processes of digestion.
   - (a) Mouth.
     - Mechanical purpose, mastication, solvents, action, aid in swallowing.
     - Chemical purpose, diastatic action.
     - Salivary glands, kinds, location, secretions.
     - Saliva, composition, properties, diastatic action and limitations, agents retarding action.
     - Physiological importance.
   - (b) Stomach.
     - Glands of mucous membrane, kinds, occurence, character of secretions.
     - Secretions.
     - Gastric juice, conditions exciting flow, influence of food, etc.
     - Composition of gastric juice. Form elements. Free acid. Organic constituents. Pepsin,—action on proteids, medium for action, rapidity of action, agents retarding action. Rennin, action on milk. Gastric lipase, action on finely divided fats such as cream.
     - Physiological importance of stomach digestion.
   - (c) Intestinal digestion.
     - Secretions. Pancreatic juice, composition, fermentative action. Intestinal juice. Bile, composition, properties, physiological action.
     - Function and importance.
4. Paths of absorption of digested foods.
   - (a) Lacteal or lymphatic, carrier medium, necessary conditions, foods absorbed, changes during absorption.
   - (b) Portal, carrier medium, process, foods carried, physiological changes in food during process.
5. Metabolism.
   - (a) Constructive, conveyance of foods to cell, importance of capillaries, building up of absorbed foods into living tissue.
   - (b) Destructive, decomposition of foods and liberation of energy, disposal of waste material.
6. Products of metabolism.
   - (a) Tissues and secretions.
   - (b) Excretory products.
   - (c) Source of muscular energy, decomposition of foods, oxidation.
   - (d) Heat equivalent of some common foods.

Biology

BIOLOGY is given to show the relation of cell growth, nutrition, and activity to organic development and to show the influence of simple forms of life such as bacteria, yeasts, molds, etc., upon food materials, the human organism, and sanitary conditions surrounding both. The work is conducted by means of lectures, discussions, and laboratory work.

1. Life,—its purpose in the organization of materials.
2. Protoplasm,—its physical and chemical structure, its occurence, its properties, tests.
3. Cell,—unit of organization, occurrence, size, shape, composition, physiology of the different parts, advantages and purposes of cell structure.
4. Cell activity,—osmosis, explanation of, plasmolysis, turgidity, wilting tension in tissues, absorption by roots, flow of sap, all depend on osmosis; these facts shown by experiment.
5. Roots, function,—cell structure and functions of parts; absorbing, growing, conducting and storage portion. Food for roots, source, nature of elements needed, suitable soils for roots. Extent of roots in soils, form of, and care of roots.
6. Stems,—leaf-bearing, conducting storage functions. Kinds,—monocolyledonous and dicotyledonous with characteristics of each. Structure,—cross sectional study and purposes of parts. Methods of lengthening and thickening of stem and formation of the different tissues.
7. Buds,—kinds, position, uses, localization of foods within them.
8. Leaves,—parts, size and form. Their structure especially emphasized because of their importance in food formation. Work of leaf. Formation of starches, sugars, and proteid. Evidence and rate of their formation shown by experiment. How each is formed.
9. Transformation,—transportation and storage of foods in different parts of plant.
10. Tests,—experimental tests made for starches, sugar, cellulose, proteids, fats and oils.
11. Enzymes in plants,—meaning, formation, classification and distribution.
12. Digestion,—definition, action of the enzymes upon the starches, proteids, oils and other foods. Experiments to show action of enzymes.
13. Growth,—cell formation. ametotic, mitotic meaning and purpose of each, stages in nuclear division and cell division from mother cell to daughter cells. Enlargement of cells, differentiation of cells into various tissues. Regions of growth, necessary conditions for growth. Age and death.
14. Reproduction,--meaning, sexual and asexual. Asexual,—somatic, budding, spore formation. Sexual,—meaning, origin, development. Two generations in plants based upon the fusion and reduction of the chromosomes in the cells concerned. Compared with animal.
15. Heredity,—methods of transmission of hereditary qualities. Sheones—Lamark's, Darwin's, De Vries, Hertwigs, Weismann's, etc.
16. Variation,—part of irritability in, conditions necessary for variation, results in natural variation due to moisture, temperature, light, food, etc. Artificial variation by crossing selection and fixation of type. Theories as to origin of a species.
17. Fruits—classification.
18. Seeds—Define parts.
19. Development of fruits and seeds. Trace from egg and sperm to completed form. Foods localized in different fruits and vegetables and seeds.
20. Microscopical examinations of lower forms of plant life found in water, examination of city water for specimens. Remedies for such.
21. Bacteriology,—the last six weeks are spent in the study of bacterea, yeasts, molds and other fungi.
22. Bacteria, — historical — form, size, shape, method of growth, rapidity of growth, spore formation, motility classification, occurrence, condition necessary for growth, moisture,

light, temperature, air, foods. Effects of bactereal growth as demonstrated in laboratory. Distribution of bacteria,—soil, water, air, foods. Methods of combating them—sterilization—use of preservatives, cold storage. Canning discussed, purposes of heating and sealing.
Bacteriology of milk and city water taken up, with actual tests in the laboratory. Testing other media, steaming and examining various kinds of bacteria.
Theory of germ diseases,—channels of infection, susceptibility, disinfectants, deodorizers, antiseptics.
Methods of disinfecting,—heat, light, gaseous, chemical.
Immunity,—natural and acquired. Formation of toxins and the use of anti-toxins. Illustrated in various diseases.

23. Yeasts,—characteristics, classification, conditions for growth. Occurrence—commercial and wild. Uses. Combating wild yeasts. Experiments to show wild yeasts—fermentation and its effects shown in laboratory.
24. Molds,—nature of growth—when it grows. Appearance — structure. Reproduction—classification. Germination of spores. Conditions necessary for growth. Methods of combating molds. Experiments carried on in laboratory.
25. Mildews,—downy and powdery mildews. Place and time of development. Methods of reproduction. How checked.
26. Smuts,—on corn, grains, their harm to plants. Methods of growth. Combating.
27. Rusts,—study of wheat rust as a type. Its life history. Effects upon tissues of the plant.
28. Higher fungi,—brief discussion with economic importance.

PHYSICS

BRIEF time allotted to this subject is utilized in the discussion of the following topics, with special emphasis upon their applications:

1. Density and specific gravity,—comparison of the two and methods of determining each for solids and liquids.
2. Liquid pressure,—cause, relation to depth, direction, magnitude; application,—city water supply, hydraulic elevators, artesian wells.
3. Air pressure on liquids,—cause, magnitude; application,—action of barometer, siphon and pumps.
4. Molecular and capillary phenomena,—surface tension, capillary action; application,—films, drops wetting of cloth, rise of oil in wicks, blotters.
5. Molecular motions,—kenetic theory of matter.
   (a) In gases,—cause of diffusion expansion, effusion, pressure; application,—mixing of gases, air thermometer, passing through membranes and porous vessels, pressure in gas pipes, bicycle tires.
   (b) In liquids,—cause of expansion, evaporation, diffusion. Application,—saturated vapors, dew point, relative humidity, sprinkling, fanning, with the various effects produced by each.
   (c) In solids,—cause of expansion, evaporation, and diffusion of solids; application,—expansion of pendulum, drying of frozen clothes, alloys, sublimation.
6. Solution,—cause, variability as to materials and as to temp, saturated solutions; application,—dissolving of sugars, salts, gums, and paints; why hot water is good for cleaning purposes.
7. Crystallization,—cause, used as a purifying process.
8. Absorption of gases.
   (a) By solids,—cause; application,—uses of charcoal, meerschaum, silk; self lighting gas burner.
   (b) In liquids,—cause; formation of aqua ammonia; corbonated drinks; aquatic life dependent upon this fact.
   (e) Effect of temperature upon absorptive power.
9. Temperature,—definition, measurement; thermometers,—construction, comparison of Fahrenheit and Centigrade thermometers, standard, maximum and minimum thermometers, with uses of each; absolute temperature.
10. Co-efficient of expansion,—definition, value in gases, variability in different liquids and at different temperatures in same liquid, variation for different solids; applications,—cooling of bodies of water with ice at surface, compensated pendulums and balance wheels, thermostats for regulating heating systems, cracking of glass, plaster, and crockery.
11. Heat,—theory, causes, measurement. Unit, laws of heat exchange; specific heat,—how determined; heat of fusion,—explanation of, value for water; melting point of crystalline and non-crystalline substances; effect of pressure on melting point; heat of vaporization,—definition, value for water, determination of.
12. Boiling,--meaning, explanation, boiling temperature and how it may be varied; application in cooking.
13. Condensation,—cause, use in steam heating systems.
14. Artificial cooling.
   (a) By solution—salt and water, salt and ice; explanation and application.
   (b) By evaporation,—applications of various processes.
   (c) Distillation,—artificial ice formation, cold storage plants.
15. Transfer of heat.
   (a) Conduction, — explanation of variability in different substances, its relation to sensation with illustrations, use in heating systems.
   (b) Convection,—explanation; application,—boiling, hot air heating, winds.
   (c) Radiation,—explanation; application,—heat from sun and from grate.
   (d) Absorption and reflection of heat.
16. Ventilation,—meaning, systems of ventilation. Heat transference and ventilation as applied to different methods of heating.
17. Light,—theory, speed, rectilinear propagation, shadows; intensity,—candle power; reflection and refraction and phenomena dependent upon these; color,—cause of, mixing of colors and of pigments.

TEXTILES

PURPOSES of the course in textiles are: (a) The development of taste and judgment in the selection of textile materials that are suited in texture, wearing quality, adaptability to use, permanence of color, harmony of design to the particular use for which they are selected; (b) the development of judgment in the purchase of materials for the home or the school under the various conditions that actually exist; (c) the organization of the subject into a comprehensive course that will provide a variety of teaching material; (d) the development of the teaching side of the subject, showing the applications of the various subjects to conditions arising in regular domestic art classes, the influence of the subject upon a well rounded knowledge of the clothing and housing of a family, and the cultural, economic, and professional value of a knowledge of textiles to a domestic science of art teacher.

1. Development of preparation of fibres.
   (a) Spinning, history, processes, present method.
   (b) Weaving;—early forms, movements in weaving kinds of looms.
   (c) Weaves and kinds of cloths in which used, plain, twill, sateens, rib, basket.
2. Study of fibres.
   (a) Vegetable, plumose, cotton, flax, hemp, jute, ramie.
   (b) Animal, silk, wool.
   (c) Mineral, asbestos.

3. Cotton.
   (a) Distribution and manner of production as influencing cost and quality.
   (b) Steps in handling, ginning, baling, marketing.
   (c) Operations in milling; bale-breaking, opening, carding, spinning, dyeing, weaving, finishing.
   (d) Products of milling; characteristics, prices, adaptation to use, wearing qualities.
4. Flax. Considered in practically the same way as the cotton, adding to general subjects given above the comparison of linen and cotton as to price, appearance, wearing qualities.
5. Silk.
   (a) Characteristics.
   (b) Treatment of cocoon producing raw silk and spun silk, with history of processes producing floss, embroidery silks, sewsilk, machine silk, and the various spun silks.
   (c) Operations in milling; dyeing, loading, weaving, and finishing.
   (d) Artificial silks, characteristics, materials used.
   (e) Products of milling, characteristics, prices, adaptations to use, wearing qualities.
6. Wool, practically same as above.
7. Other fibres, hemp, jute, ramie, asbestos.
8. Dyeing.
   (a) Definition.
   (b) Effect upon fibres.
   (c) Elements, color, mordant, assistants.
9. Bibliography.

Model and Plain Sewing

WORK in model and plain sewing are given: (a) To teach the fundamentals of sewing and their application; (b) to develope skill in the handling of materials and in the application of the fundamental principles of sewing; (c) to form high ideals of accuracy, neatness, system and of the other qualities that go to make up perfection of work; (d) to give students content from which they will be able to organize a course of study; (e) to show development of subject matter and its teaching possibilities and to illustrate methods of presentation of lessons and class management.

The course in sewing in the junior year includes model work, the making of models of the various steps in sewing, applications of model work to articles of use by means of hand sewing; application to simple garments, such as underwear, aprons, plain waists, by means of both hand and machine sewing.

1. Canvas work.
   (a) Samplers, running, basting, stitching stitches, catch stitch, cross stitch.
   (b) Application to article of use, mats, bags, handkerchief cases, any small useful article on which the stitches may be used.
2. Hems and hemming.
   (a) Straight hems on paper, on muslin.
   (b) Corner hems, square, mitred.
   (c) Application on doll's pillow-case.
3. Ruffles and bands.
   (a) Practice ruffle set into band.
   (b) Application in small apron.

4. Darning.
   (a) Weaving on cardboard to show warp and woof.
   (b) Stockinet darn, practice, application on stockings.
   (c) Cloth darning with ravelings on plain, plaid, and striped cloth, straight, bias, corner, patch.
   (d) Damask darning, diagonal, herring-bone, diamond, square, figured.
   (e) Application on worn garments and in ornamental darning on crash for pillow-covers, table runners, and centerpieces. Where ornamental darning is used, pupils make their own designs.
5. Patching.
   (a) Patches of various shapes, round, square, hemmed, etc.
   (b) Matching of stripes and plaids in patching.
   (c) Application of patching to garments and articles.
6. Linen work.
   (a) Plain and fancy hem stitching.
   (b) Simple drawn work.
   (c) Pattern weaving in borders.
   (d) Application to towels and household linens.
7. Flannel work.
   (a) Seams, opened and catch stitched, felled, bound.
   (b) Fancy stitches, feather stitch, coral stitch, chain stitch, blanket stitch.
   (c) Patching, catch-stitch.
   (d) Binding with ribbon.
8. Practice seams on muslin,—French, felled, bound, hemmed.
9. Practice plackets and gussets.
10. Button holes.
    (a) Muslin, round corners, barred corners.
    (b) Wool, round corners, tailored corners, eyelets.
11. Sewing on buttons, tape, hooks and eyes.
12. Trimming for muslin work,—tucking, rolled edge, putting in insertion, lace, and embroidery, fancy stitches used for trimming.
13. Application of preceding points to:
    (a) Model white underskirt, half size.
    (b) Four piece set of undergarments, standard size, designing, drafting, cutting, fitting, and finishing.

Dressmaking

PURPOSES of the work in dressmaking are: (a) To teach the art of dressmaking; (b) to teach the use of a system of drafting by which patterns are designed and made; (c) to teach the designing of ordinary garments, the use of line, proportion, color, adaptation of materials; (d) to develop skill in the handling of materials and in the application of the fundamentals of sewing; (e) to develop judgment, neatness, accuracy, self-reliance, originality, and high ideals of work; (f) to teach the logical sequence of the work and by discussions, illustrations, demonstrations, and actual conduct of the class to teach methods of presenting subject matter and conduct of dressmaking classes for less mature pupils. The course includes:

1. Shirtwaists.
   (a) Draft of plain shirtwaist and sleeve to different measurements in order to learn use of system.
   (b) Design of shirtwaist patterns in paper.
   Three designs and patterns made to specific directions.
   Two original designs and patterns.
   (c) Tailored shirtwaist designed and drafted from individual measurement.
   (d) Models of sleeve placket and cuff.
   (e) Cotton shirtwaist made from preceding designs and models.
2. Skirts.
   (a) Drafts,—seven gored, nine gored, flared skirt, all drafts made to given measurements.
   (b) Wash skirt of percale, gingham, or linen, made from preceding

designs and patterns from individual measurements.

(c) Flounces designed in paper,—fitted, circular, pleated, made to given measurements; two original pleated flounces.

(d) Skirt designs in paper.
Pleated skirts,—full length pleats on seams.
Tucked skirts,—solid tucks, box pleated back.
Pleats set in below hips,—original designs.

(e) Models of seams on woolen cloth,—bound, felled, lapped, pressing of seams.

(f) Woolen skirt,—made from pattern designed and drafted to measure and application of models.

3. Silk or wool waist.
   (a) Design and draft from individual measurements.
   (b) Selection of material and trimmings.
   (c) Making and finishing of waist.
4. Morning dress of gingham, percale, etc.,—patterns and designs made to individual measurements.
5. Afternoon dress of batiste, dimity, or other thin material,—same as above.

Millinery

PURPOSES: (a) To teach the art of designing, making, and trimming of hats; (b) to develop skill in the handling of materials and tastes in their selection and combination; (c) to present subject matter that may be used in planning courses of study; (d) to deal with development of subject matter, suitability to public school conditions, value to pupils, method of presentation, and organization of courses of study; (e) to discuss necessary equipment and materials, kinds, prices, and where best obtained.

That the work may be conducted on practical lines the subject is divided into fall millinery and spring millinery, the interval of time between the two lines of work being devoted to art needle work.

1. Fall millinery.
   (a) Wire work,—preparation of wire, bandeaux, buckles, the making of frame from measurements, frame for sailor hat.
   (b) Renovating and cleaning,—velvet, felt, feathers, lace, ribbons, chiffon.
   (c) Tinting,—use of gasoline and oil paints, colored powder and chalk.
   (d) Making of bows,—designing and making in tissue paper.
   (e) Proportion in hats.
   (f) Study of styles,—comparison of present with preceding.
   (g) Remodeling.
   (h) Materials used in hats,—source, values.
   (i) Millinery stitches,—fly-running, back stitch, overcasting, feather, slip stitch, saddlers, lacing.
   (j) Preparation of trimming,—bias folds, points, ears, rolled hem, plain folds, milliners' folds, double folds, French folds.
   (k) Wiring.
   (l) Buckram frame from original design, — making, covering, trimming, lining, discussion of selection of materials and cost.
2. Spring millinery.
   (a) Study of styles.
   (b) Discussion of materials,—kinds, combination, cost.
   (c) Remodeling of old hats.
   (d) Review of frame making.
   (e) Street hat,—frame, covering, straw sewing, trimming, finishing.
   (f) Lingerie hat, — embroidered, lace, net.

Where hand embroidered materials are used, the designing and embroidering are done in the art needlework class.

Art Needlework

ART needle work is planned: (a) To give training in the application of a knowledge of design and skill in fine needle work to the finishing or decoration of articles of use, either clothing or house furnishings; (b) to develop taste, skill, neatness, and accuracy in work; (c) to show the arrangement and development of the subject, its training value, its use in grade and high school courses of study, and the manner of presentation.

That the purposes may be realized, it is necessary to relate the work to the work in design, showing the essentials of good design and the essentials in good art needle work design. The different lines of art needle work are considered under the heads given below and worked out on articles chosen by each student.

1. Characteristics.
2. Design,—adaptation of design to line in needle work.
3. Articles suited to kind of finish or decoration.
4. Materials suited to kind of finish, decoration, design.
5. Materials,—source, selection, cost.
6. Art needlework stitches.
7. Finishing.
8. Kinds of work,—hemstitching, darning, applique, cross stitch lettering, scallops and dots, Wallachian, cut work, eyelet, Bermuda fagoting, French embroidery, drawn work.

Mechanical Drawing

A COURSE of drawings is presented that will enable students to acquire a knowledge of the principles of projection and perspective with the application of these principles to working drawings. The course is also designed to give a training in neatness, accuracy and skill in execution.

1. Sheet of lines, letters and dimensioning.
2. Projection of solids.
3. Projection of prism at angle.
4. Projection of prism at double angle.
5. Perspective of prism.
6. Perspective of chair and table in room.
7. Working drawing of table.
8. Working drawing of cabinet.
9. House plan.
10. House elevation.
11. Room development.

Drawing and Design

DRAWING and design are planned to include such principles of design, color, and sketching, as shall be needed in carrying out subsequent lines of work. Only work having a direct application in the remaining course of study is undertaken and the purpose is practical rather than professional. The course includes:

1. Drawing from life and object.
   (a) Still life, objects to be used as illustrative material.
   (b) Life, the human figure.
2. Design.
   (a) Spacing and proportion,—stripes, plaids, squares, oblongs, triangles, circles.
   (b) Surface design,—spots, borders, stencils, block-printing, embroidery, applique, darning.
3. Color.
   (a) Composition.
   (b) Harmony,—analogy, contrast.
4. Millinery.
   (a) Drawing,—frames, bows, trimmings.
   (b) Original designs.
   (c) Color combinations.
5. Garment making.
   (a) Sketching from life and object.
   (b) Underwear,—designing.
   (c) Costume,—designing, color combinations.
6. Blackboard illustration.
   Use of blackboard in presenting subject matter.

Interior Decoration and Furnishing

THE purpose of this course is two-fold, to prepare students to create an artistic home environment and out of their knowledge of the basic principles of art and good design as applied to interiors, to evolve a course of study that can be successfully carried out in the ordinary schools under present conditions and find direct application in the homes of the pupils.

Before the student is ready to receive this instruction, it is necessary that she have a fair knowledge of free-hand drawing, she must know something of mechanical drawing, the principles of prespective, the use of design and color, and be able to display originality. The courses in drawing and design and mechanical drawing in the junior year provide this training to students of limited or no previous training.

The work is carried on by means of talks, recitations, discussions, study and investigations, drawing, painting, designing, and the application of the principles of color and design to things used in the home. A portion of the time each year is devoted to practical work in applied design carried out in the actual remodeling, decorating, and furnishing of a house or of suites of rooms suited to various uses.

The general course of study follows with some topics worked out in full, showing the method of development.

1. Design.
   (a) Nature applied to design.
   (b) Historic ornament.
   (c) Original designs and adaptation.
   (d) Applied design,—wall decorations, stencils.
2. Color.
   (a) Composition; (b) harmony; (c) light; (d) physical effects; (e) psychological effects.
3. House planning.
   (a) For convenience.
   (b) For artistic effect.

   Each pupil is required to plan a cottage of a given number of rooms at a given cost and must carry out her plans in detail, showing all floor plans, elevations and perspective, together with views of the interior, showing color schemes, decorations, and furnishings.
4. House decorations and furnishing.
   (a) Color,—combinations suited to designs and use.
   (b) Finishes,—for walls, floors, wood work.
   (c) Textiles used,—floor coverings, hangings, curtains, cushions, and covers.
   (d) Ornaments,—pictures, pottery, china, and bric-a-brac.
   (e) Furniture,—use, materials, form, and ornamentation.

Household Management

IN arranging the subject matter taught in household management an attempt has been made to assemble the numerous lines of instruction and fields of experience necessary to organize and administer the affairs of a home into one general course. This information and experience are so varied that they include all of the lines of activity found in a home. In the correct organization of such varied activities each assumes its proper proportions and the result is a well regulated system for the performance of the business of the household and the regulation of its relations to the social and industrial world.

The primary practical purpose of this line of work is to show the relation of science, art, economics, and practical application.

The relations of the home to society at large in its social, industrial, and ethical aspects is emphasized, for the woman in the home is a factor in social and industrial life.

The relating of this course of instruction to science and art subjects taught in regular school systems is shown and methods of correlating regular instruction and instruction in special lines are pointed out.

Because of the scope of the subject and the necessity for little equipment in its teaching, household management presents greater teaching possibilities than many lines of instruction. The development of the subject, its training value, and methods of presentation are included as a part of the instruction.

For convenience in consideration, the general subject may be subdivided as follows:

1. House sanitation.
   (a) Location,—surroundings, elevation, exposure, water supply.
   (b) Construction,—cellar, foundations, materials, general plan.
   (c) Heating,—principles, methods, discussion of each method.
   (d) Ventilation,—necessity for, principles, methods.
   (e) Lighting,—principles, methods, discussion of each method.
   (f) Plumbing and drainage,—essentials of good system, arrangement, parts, care.
   (g) Cleaning and cleansing agents,—character of dirt, materials to be cleaned, agents, action of agents. Laundering is included as an operation in cleaning.
2. House furnishing correlates closely with the work in household decoration and furnishing, carrying out the theoretical suggestions into practical application, selections, estimates of cost. The furnishings considered include:
   (a) Floor coverings,——materials, values, adaptation, color and design, conformity to walls, etc.
   (b) Wall finishes and covers,—materials, etc., same as above.
   (c) Curtains and draperies.
   (d) Furniture, — style, adaptation, design, conformity to use and to surroundings.
   (e) Fittings and utensils,—china, silver, linen, utensils.
3. Business organization.
   (a) Apportioning of income,—food, shelter, clothing, education, charity, culture.
   (b) Household expense accounts.
   (c) System in management of work and business.
   (d) Purchasing of materials.
4. Social, industrial, ethical relations.
   (a) Labor in the home.
   (b) The home as a factor in consumption and disbursement.
   (c) The individuals' relation to the home organization.
   (d) The moral obligations of the home to society.

Psychology and Pedagogy

See Psychology and Pedagogy under Manual Training Courses.

Observation of Teaching and Practice Teaching

See Observation of Teaching and Practice Teaching under Manual Training Courses.

Organization and Management of Domestic Science and Domestic Art Classes in Public Schools

IT is necessary that the student understand the professional as well as the practical and economic bearing of the subject. Many of the training possibilities of the various lines of work are emphasized in the regular

course of instruction, attention being called to the mental processes involved, the specific training value, the organization of material, and presentation of subject matter, using the regular class work to illustrate processes. In observation and practice teaching still more emphasis is placed upon the necessity for understanding mental processes in development and the influence exerted by proper selection, sequence, and presentation of subject matter. The actual organization and handling of public school classes of different grades gives opportunity to acquire at first hand knowledge of the stages of development of pupils of different ages.

In addition to this purely professional knowledge on the part of the teacher there must be an ability to obtain information regarding the surroundings and environment of the pupil, school, social and industrial conditions, and the ability to handle the business side of her work as a part of the school system and as a factor in the community.

The following course in organization and management has as its aim the working out of the relation of the subjects of instruction included in a complete domestic science course and the indicating of the peculiar professional possibilities of each line of work with the relation of the various professional aims in a unified course of instruction, as well as the organization of the practical information needed by a teacher in introducing or conducting the work.

As supervisory work is often required of a domestic science teacher, attention is given to the arrangement and supervision of work conducted by the regular teacher.

The following brief statement shows the scope of the work:

1. History and status of Domestic Science in schools.
2. Practical purpose in its teaching.
3. Educational value and purpose.
4. Scope of the subject.
   (a) Science, chemistry, physiology, physics, biology, dietetics.
   (b) Art, use of color, design, house decoration, designing of trimmings, garments, etc.
   (c) Economics, relation of home to surroundings, social and industrial.
5. Place in regular course of study.
   (a) Relation to other lines already taught.
   (b) Sequence of work as determined by psychological and pedagogical principles.
6. Planning of courses of study.
   (a) With reference to environment.
   (b) With reference to development of pupil.
   (c) With reference to possibilities of school system.
7. Organization of classes in public schools.
8. Presentation of subject matter.
   (a) Preparation for lesson by teacher, the lesson plan, preparation of materials.
   (b) Presentation of subject, theoretical treatment, method of conducting practical application.
9. Study of equipment.
   (a) Rooms, plans, diminsions, etc.
   (b) Furnishings, kinds, cost, where obtained.
10. Cost of maintenance.
11. The special teacher.
   (a) Attitude toward other lines of work.
   (b) Relations with regular teachers.
   (c) Supervision and conduct of teachers' classes.

English

ENGLISH as given in the training schools is designed to aid the student in overcoming bad habits of speech and writing. Oral topics relating to the subject of domestic science, such as explanation of

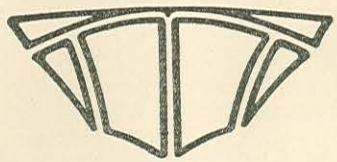
processes of cooking—form the nucleus of the recitation work. Short speeches, a class paper, and the presentation of current topics of interest lend variety to the subject. For written work, daily paragraph themes illustrating various methods of exposition are required for the larger part of the course, outlines for all oral topics are prepared, and at least one long theme is written. In the paragraph theme attention is paid to matters of punctuation and correctness of idiom rather than to graces of style.

Physical Training

OPPORTUNITY is offered to Domestic Science students for physical training in regular classes in the gymnasium.

Electives

ELECTIVES in literature, work selected in the Manual Training Courses or in Drawing will be taken the equivalent of one hour daily throughout the course. In the selection of electives, students will be expected to advise with and secure the approval of the director of the training school.



KINDERGARTEN SCHEDULE

For Outlines of Courses, see Bulletin for December, 1907.

JUNIOR CLASS

FIRST SEMESTER

	Number Periods per week	Number of Weeks
Psychology	5	18
Expression	5	8
Music	5	10
Kindergarten Technics	5	18
Kindergarten Observation	2	10
Nature Study	3	10
Drawing	10	8
Physical Culture	2	18

SECOND SEMESTER

Composition	5	10
Kindergarten Theory	5	8
Kindergarten Technics	10	8
Ethice	3	10
Nature Study	2	10
Mechanical Drawing	5	8
Music	2	10
Kindergarten Observation	3	10
Chorus	1	18
Physical Culture	2	18

SENIOR CLASS

FIRST SEMESTER

Primary Pedagogics	3	18
Kindergarten Principles	5	10
Child Study	5	10
Literature	5	10
Kindergarten Teaching	15	8
Physical Culture	2	18
Chorus	1	18

SECOND SEMESTER

Primary Pedagogics	3	18
Literature	5	8
History and Literature of Education	5	10
Kindergarten Teaching	2	10
Primary Teaching	2	8
Physical Culture	2	18
Chorus	1	18
Electives	5	18

GRADUATE CLASSES

ELEMENTARY EDUCATION

Scope, Purposes, Characteristics, and Methods of Elementary Education.

INSTRUCTION AND SUPERVISION

Effeective Supervision, Ends, Materials and Forces in the Educative Process, Child Study, Educational Means and Methods, Tact and Skill in Supervision.

KINDERGARTEN AND PRIMARY HANDWORK

Extension of Scope, Improvement in Characoter, Art Training, Constructive Work.

A PRACTICAL SCHOOL FOR HOME-MAKERS

SINCE the Domestic Science Training School for teachers has been organized, an extensive correspondence has developed the fact that there are many young women who would be glad to take a systematic course of training in domestic art and science for its practical and cultural value, but with out any intention of becoming teachers. To meet this demand a practical school for home-makers has been organized, with courses planned to give a thorough training for the organization and administration of the affairs of the home through the application of scientific, economic and artistic principles.

There are scientific principles which should be applied in the choice of foodstuffs and foods, in their preparation and combination, and in the use of foods appropriate to varying conditions of age, health and environment. There are scietific principles which should control the installation and care of plumbing and appliances for heating, lighting and ventilating houses that should guide to some extent in the selection of furnishings and in the care of furnishings and of the house itself, as well as of all the materials found in a house, whether food, clothing or furnishings.

There are artistic principles which should be observed in the planning and arrangement of the rooms of the house and in their decoration and furnishing.

There are economic principles which must be recognized in the application of both the scientific and artistic principles and in the practical administration of the affairs of the household. Whether she is conscious of the fact, whether she will or not, the woman sustains ethical, social, and industrial relations with the other members of the family and with the members of society outside her home. These relations exist because the home and society exist as distinct organisms with definite functions, and because she is necessarily a part of each of these organisms. These relations afford opportunity and entail responsibilities. That woman shall effectively use these opportunities and discharge these responsibilities is of the highest importance to her, to the home, and to society. The first condition of wise and effective action in this field is a knowledge of existing conditions, wherein they need modification, and how such modification may be effected.

The courses offered include:

1. A study of food and foodstuffs, involving a consideration and comparison of food values and of market values; the correct combination of food material; the selection and care of foodstuffs; the best method of preserving foods; tests for purity of foods; dietetics, or the study of the adaptation of food to age, health, occupation and environment. The work in the preparation of foods covers plain and fancy cooking and invalid cooking, and the preparation and serving of foods of all kinds.

2. A study of textiles, and training in the operations necessary for the transformation of textile materials into articles of clothing, or for decorative and house furnishing purposes. This embraces hand

and machine sewing; cutting, fitting and making of garments; and millinery.

3. House decoration and furnishing. This course is not given for the purpose of training professional house decorators, but for the development of such taste and judgment in the selection and arrangement of decorations and furnishings as ought to be possessed by every woman who is to have charge of a home. It is not the purpose to develop taste that can be satisfied only by expenditure beyond appropriate limits, but to make clear that good taste may be exhibited in the humblest home and with a modest expenditure of money.

4. Household management, involving the organization and management of the affairs of the household. Among these affairs may be mentioned the selection and purchase of foodstuffs, clothing and articles for furnishing and decorating the home; the practical and economical care of these things; the securing and maintaining of sanitary conditions; the care of different apartments of the house; the various cleansing operations necessary in the household; the apportioning of the income among the various expenditures for the home; and the keeping of household accounts.

5. Home nursing and emergencies, including a consideration of the questions of home nursing which arise in every household: The proper feeding, clothing, and care of infants and young children; the care of members of the household during illness; the care of the sick room and its furnishings; treatment of accidents, and the proper action in case of emergencies; the prevention of disease and the use of disinfectants.

6. Home economics, a knowledge of woman's social, ethical and industrial relations with the other members of the family and with society at large necessitates a course of study dealing with social needs, responsibilities, and customs in the family and in society; of industrial organization, and of the relation of the family to this industrial organization; of ethics, or the moral obligations of the members of the family to each other and to society.

7. In addition to the practical courses above given, definite instruction is given in English and Literature, especially in the literature of domestic art and science; in Freehand drawing and color work, in Mechanical drawing, and Applied design.

A corps of experienced teachers trained not only in the theoretical, but in the practical phases of the work has charge of the instruction in the different courses. Admirable laboratory facilities are provided for all phases of the scientific and practical work. A special feature is a nine room house adjacent to the school buildings, used exclusively for purposes of laboratory work in the course in house decorating and furnishing.

In the work of this course students prepare designs for the decorating of the different rooms and then take charge of the decoration in accordance with the designs adopted.

Students attending this school make their homes in dormitories constructed upon the cottage system. Each cottage is in charge of a competent person and will accommodate a limited number of girls. It is the plan to furnish, as nearly as possible, ideal home conditions for living while students are attending the school. Each cottage will be not only a home, but a laboratory in which many of the lines of training may be practically carried out. Different styles of decoration will be used in different rooms, and the furniture for each room will be selected to harmonize with the decorative effect. These different styles of decorating and furnishing will be used for illustrative purposes in the work of the course.

Each student will have an opportunity and will be required to become thoroughly conversant with the different operations necessary in the practical care of the different rooms in the cottage.

At the proper stage of advancement students will be given charge of the preparation of menus, selection and purchase of food for the table and the serving of food. This work will not be required of any student beyond the point where it ceases to have an educational value.

It is believed that the advantages offered by this school will be appreciated by many people who believe that home making is a serious business and that specific preparation for it is really worth while.

STUDENTS 1907-1908

MANUAL TRAINING

SENIORS

Bailey, Paul E., Menomonie, Wis.
Brockus, Charles A., Sharpsville, Ind.
Byrnes, Charles W., Oconomowoc, Wis.
Curran, Fred L. Westfield, "
Engeseth, Edward J., De Forest, "
Jungck, Harry H., Menomonie, "
McNeal, J. Raymond " "
Newcomb, Max E. Pepin, "
Nott, Frank L. Menomonie, "
Osen, Arthur L., Oconomowoc, "
Rees, Thomas S. Wales, "
Spaulding, Benjamin W., Oconomowoc, "
Steckel, Frank J., Menomonie, "
Steendahl, Sam'l F. " "
Touton, Luis L. Edgerton, "
Van Dalsem, Newton, Menomonie, "
West, R. D. Iron Mountain, Mich.
Zittleman, Henry T., Menomonie, Wis.

JUNIORS

Bauman, Max H. Watertown, Wis.
Bonell, Grant R. Menomonie, "
Bowman, Clyde A. " "
Chalfant, Earl R. Downsville, "
Chloupek, Roland E., Manitowoc, "
Coffin, Theodora L., Eau Claire, "
Coram, Arthur R., Menomonie, "
Funsett, Harlow G., Deerfield, "
Gerber, Henry P., Menomonie, "
*Hanson, Emma, Owatonna, Minn.
Harlacher, Eugene H., Cheyenne, Wyo.
Hoeffin, Alvin V. Munson, Pa.
Kavanaugh, Charles P., Downing, Wis.
Kavanaugh, Michael F., " "
Little, Earl W. Pepin, "
Lockwood, Wesley R., Mason City, Ia.
McKeever, James F. Oconto, Wis.
Miller, O. M. La Junta, Colo.
Price, George G. Oakfield, Wis.
Roehl, Louis M. Loyal, "
Scharr, Harvey J., Menomonie, "
Snively, Harvey K. " "
Weatherby, Harold L., San Diego, Cal.

* Special

DOMESTIC SCIENCE

JUNIORS

Anderson, Ethel E., Norway, Mich.
Beck, Frances C., Madison, Wis.
Burdick, Cora B., Menomonie, "
Chamberlin, Bessie A. " "
Clayton, Dora, St. Croix Falls, "
Considine, Brightie E., Chicago, Ill.
Culver, Maude E., Cobb, Wis.
Davis, Genevieve C., Abilene, Kan.
Devereux, Mildred, Ada, Minn.
Englebretson, Cliffie L., Chippewa Falls, Wis.
Farwell, Anna V., Madison, "
Goessling, Jennie, Glenbeulah, "
Hogan, Elizabeth, Duluth, Minn.
Hooey, Helen M., Rice Lake, Wis.
Hough, Helen E., Ironwood, Mich.
Ingram, Emily J., Florence, Wis.
Jackson, Jessie P., St. Paul, Minn
Jackman, Grace M., Burlington, Ia.
Jensen, Anna C. Green Bay, Wis.
Kihm, Lillian Dickinson, N. D.
Klumb, Edna West Bend, Wis.
Latta, Nina, Clinton, "
Looney, Margie, Menomonie, "
McDowell, Edith, Manhattan, Kan.
McGilvra, Esther E., Menomonie, Wis.
McGilvra, Martha, " "
McLean, Marguerite L., " "
Moreland, Grace, St. Paul, Minn.
McMullen, Katherine, Taychudah, Wis.
Oliver, Frances M., Eau Claire, "
Oliver, Jessie M., Columbus, "
Patterson, Alice C., Bloomington, "
Reynolds, Lucile W., Jacksonport, "
Riley, Laura A., Chippewa Falls, "
Royce, Lillian B., Fort Atkinson, "
Ristow, Lillian L., Onalaska, "
Showalter, Winifred R., Madison, "
Stearnes Helen, Monroe, "
Taft, Blanche Whitmore, Whitewater, "
Thomas, Emily M., Menomonie, "
Theurer, Jessie L., Baraboo, "
Vanitvelt, Sylvia H., Waucedah, Mich.
Wyatt, Ethel V., Tomah, Wis.
Zaudke, Nora, Whitewater, "

DOMESTIC SCIENCE

SENIORS

Blaisdell, Eula E. Darlington, Wis.
Bishoff, Kittie L., Ashland, "
Carlsted, Ester W., " "
Dodson, Elizabeth, Berlin, "
Evjen, Mayranda, La Crosse, "
Fenton, Theo Madison, "
Fruit, Alice M. La Crosse, "
Gorton, Irma, Arcadia, "
Graham, Elisabeth, Eau Claire, "
Kramer, Anna, Menomonie, "
Marsh, Clarabelle, Neillsville, "
Moore, Florence V., Wauwatosa, Wis.
McMillan, Anna, Grand Rapids, "
Moran, Josephine, Menomonie, "
Moran, Katherine, " "
Morterud, Caroline, Westby, "
Newton, Blanche, Sullivan, "
Perkins, Elizabeth E., Burlington, "
Strong, Ethel E., Lake Mills, "
Wearne, Amy E., Calumet, Mich.
Wasch, Matilda H., Onalaska, Wis.

KINDERGARTEN

JUNIORS

Arnold, Hazel, Sharon, Wis.
Byrne, Margie R., Sharon, "
Drake, Grace C., La Crosse, "
Drowatzki, Ella S., Tomah, "
Fall, Florence, Hudson, "
Flaherty, Jessie K., Hazelhurst, "
Frautschi, Alice V., Madison, "
*Fruit, Edna Ruth, La Crosse, "
Grimshaw, Bonnie, Elroy, "
Hale, Bessie Van, Mauston, "
Healy, Frances P., Ironwood, Mich.
Huntsman, Marie A., Menominee, "
Lewis, Dot, Boscobel, Wis.
Liver, Iva May, Independence, "
Maurer, Elsie Medford, "
Morrison, Ruth G., Rice Lake, "
Rounseville, Odanah, Antigo, "

* Special

SENIORS

Bailey, Marjorie, Glen Ellyn, Ill.
Bartlett, Maude, Eau Claire, Wis.
Campbell, Beryl, Rice Lake, "
Clark, Helen, Hudson, "
Hamar, Edna, Marinette, "
Kyle, Jennie, Menomonie, "
Lusk, Grace W., River Falls, "
Mayers, Mayme R., Menomonie, "
Neuman, Pearl, Elroy, "
Jahn, Clara A., Alma, "
Pinkerton, Agnes, Prairie du Chien, "
Pingel, Minnie D., Tomah, "
Quinlan, Helen, Marinette, "
Schweppe, Amma A., Medford, "
Sullivan, Catherine C. New London, "
Tilleson, Alice, Memomonie, "
Volkman, Bertha, Eau Claire, "
Young, Margaret, Wausau, "

SCHOOL FOR HOME MAKERS

JUNIORS

Dunn, Adelaide, St. Cloud, Minn.
Hankwitz, Ida, Merrill, Wis.
Isaacson, Enid, St. Croix Falls, Wis.
Niles, Gussie, Brodhead, "
Vidger, Edna N., Fargo, N. D.

ENROLLMENT BY YEARS

	1903-4	1904-5	1905-6	1906-7	1907-8
Manual Training School	3	15	20	27	41
Domestic Science Training School	21	36	38	47	65
Kindergarten Training School	35	31	34	36	35
School for Home Makers	...	...	...	...	5
Totals	59	82	92	110	146

PHYSICAL TRAINING RESULTS

THE MENOMONIE SCHOOL BOY VERSUS THE NORMAL AMERICAN BOY

FROM a large number of measurements secured by Dr. D. A. Sargent of Harvard University, charts have been prepared showing the height, weight, capacity of lungs, strengths and girths of boys of different ages. Thus, for example, the normal boy of fourteen years is 5 feet 2 inches tall, weighs 98 lbs., has a lung capacity of 160 cu. in., can lift 205 lbs. with the muscles of his back, and 315 lbs. with the muscles of his legs; he can grip 55 lbs. and the strength of chest is 77 lbs. These Sargent charts also show the girth of calf, thigh, waist, chest, head, etc., so that the complete set of measurements is so comprehensive as to entail much labor and involve much time. The complete set of measurements has not been attempted at Menomonie.

But for the purpose of interesting the pupils in their own development and affording them an opportunity of comparing themselves with the normal boy of the same age, the Stout School of Physical Training has taken the Strength Tests of all boys coming to the gymnasium for work and a comparison of the average Menomonie boy with the normal boy as determined by Dr. Sargent seems to prove conclusively the value of systematic physical training when extended over a number of years.

The work in Menomonie was inaugurated six years ago, so that the present fourth year high school boys were in the sixth grade when it began. Below the sixth grade, exercises are given in the school room by the teachers under supervision of the director of the gymnasium or his assistant, but the sixth and all succeeding grades take regular work in the gymnasium. The aim of the work is to promote the health of the pupils, to improve their muscular control, to counteract the injurious effects of confinement in the school room and to secure discipline and rational physical development. As above stated, the strength tests are used merely to interest the pupils and to stimulate them to do voluntary work for their own improvement. Yet their superiority over the normal boy is very marked in almost every particular.

The average Menomonie boy of 14 years can lift with the muscles of his back, 10 lbs. more than the Sargent boy; the boy of fifteen, 15.7 lbs.; the boys of sixteen, 33.8 lbs.; the boy of seventeen 59.2 lbs., and the boy of eighteen years, 110 lbs.

With the leg muscles, the Menomonie boy of fourteen lifts 73 lbs. more than the average; the boy of fifteen, 154 lbs.; of sixteen, 159 lbs.; of seventeen, 234 lbs., and the boy of eighteen, 347 lbs., all more than the average.

The fourteen year old Menomonie boy can grip 10.8 lbs. more than the normal American boy; the boy of fifteen grips 9.4 lbs. more; the boy

of sixteen years is just normal; the boy of seventeen grips 6.3 lbs. and the boy of eighteen years 15.8 lbs. more than the normal.

For the ages above quoted, the local boys have 17 lbs., 66 lbs., 60.9 lbs., 90.8 lbs. and 153.8 lbs. respectively more strength of chest and upper arms than the normal Sargent boy.

In the matter of height, the difference, of course, is not nearly so great. In fact, the indications are that the period of rapid growth does not occur so young in Menomonie as in the locality where the Sargent measurements were taken. At fourteen years of age, the Menomonie boy is nine-tenths of an inch shorter than the Sargent boy; at fifteen years, seven-tenths shorter; at sixteen years, nearly two inches shorter; at seventeen years, three-tenths of an inch shorter, and at eighteen years, he is four-tenths of an inch taller. What effect, if any, his exercise has had upon the age of puberty or rapid growth the writer is not prepared to say, but he would venture the opinion that if it succeeds in postponing this period, developing the boy along other lines instead of permitting him to shoot upward in height, it would be a decided gain.

In the matter of weight there is very little difference at the ages of fourteen and fifteen years, but corresponding to the big difference in height at the sixteenth year, the Menomonie boy is nearly 12 lbs. lighter than the normal. At seventeen years, this difference drops to 4 lbs., and at eighteen years, the Menomonie boy is almost 8 lbs. heavier than the average American boy.

Since the lung capacity depends to a considerable extent upon the length of the body, differences corresponding to those in height would be expected. At fourteen years of age, the Menomonie boy has ten cubic inches less lung capacity; at fifteen years 17 inches, and at sixteen years 24 cubic inches less than the average, while at seventeen years, he has 7 more, and at eighteen years 5 more than the average. Thus, while the Menomonie boys appear to be smaller at sixteen years of age, they surpass the normal in every particular at eighteen years.

The above statistics are not obtained from selected groups. Classes as a whole were taken and there were 107 boys in all. The tests were not made for the purpose of furnishing material for this article. On the contrary, it was the striking statistics which suggested the article.

In connection with the above figures, it is interesting to note also, that in the five years in which Menomonie has sent a team to the Wisconsin Interscholastic Meet at Madison, it was won first place twice, second place once, and third place once, although the enrollment of the Menomonie High School is only a little over 200, while a considerable number of schools sending teams to the Meet have an enrollment of from five to eight hundred. The phenomenal success of the Relay team is also worthy of passing notice. For the entire five years in succession, the Relay team has won the mile event. Coming at the close of the day, when the athletes are tired from the exertions of the other events, the relay is an admirable test of the endurance and determination of the men, and the Menomonie team has demonstrated the fact that it lacks neither of these qualities. No special effort is made to develop high class athletes.

The students as a whole take systematic work and the result is that a large number of students possess more than average ability and a few develop ability of a high order. Taking all these facts into consideration, it is safe to say that the Menomonie boy has the strength, speed and endurance, combined with a consciousness of his own powers, a self control and a determination which must prove of value to him in the struggle for life, particularly when it is impressed on him that athletics are not the end, but merely the means to the end.

N. J. MAC ARTHUR,
Director Stout School of Physical Culture (1902-1908).

SUMMER SESSION FOR 1908

JULY 27TH—AUGUST 29TH

MANUAL TRAINING AND DOMESTIC ECONOMY

General Statement

LAST year the interest in summer study appeared to be strong, and the desire on the part of students to take special kinds of work during the summer months was marked. In response to the expressed wishes of students in attendance during the summer session of the Stout Training Schools for 1907, three new courses have been added, and the dates of the session made one week later than last year.

The attendance during this session was more than double that of the preceding year and was very flattering in point of numbers. Students were enrolled from Maine, Montana, Colorado, Ohio, Indiana, Texas, Missouri,—and in all, from fifteen different states and from Canada. Most of those in attendance were supervisors or teachers of manual training or domestic science and art, though there were a number of grade teachers whose purpose was to prepare themselves for teaching primary handwork or plain sewing.

Purposes of the Summer School

COURSES are planned to meet the requirements of several classes of teachers and students:

1. Teachers of Manual Training and of Domestic Art and Science who wish to strengthen their work in certain lines, either in technic or on the professional side.

2. Superintendents and Principals of Public Schools who desire to gain a first hand conception of the character and results of work in Manual Training and in Domestic Art and Science as administered in the Menomonie Public School System and in the Stout Schools for the training of teachers of these subjects, and who also desire to secure a practical acquaintance with some forms of hand work.

3. Teachers in graded schools who wish to fit themselves to teach hand work in its elementary forms in their own schools, but who have not had an opportunity to secure such training as is necessary to undertake the work intelligently and with confidence. The increasing demand for the introduction of various forms of hand work in the primary and intermediate grades in city systems of schools, makes the opportunities afforded by the Summer School specially valuable to this class of teachers.

4. Persons planning to take either of the regular courses in the Stout Training Schools may anticipate some of the work in such course, by a judicious selection of work in the Summer School, and thus lighten the prescribed work, or gain time for advanced work in special lines.

5. Training School students who wish to make up deficiencies, or to secure credits on the remaining work of their course, or to do special

work offered in the Summer School and not required in the courses they are regularly taking.

6. Persons wishing to gain practical experience in various forms of Crafts work will find a variety of opportunities offered through work in wood, bent iron, copper, brass, and silver, also in basketry and weaving.

Choice of Courses

IT will be possible for students to elect two or three courses during one summer session. The following courses will be offered:

MANUAL TRAINING

1. Organization and Administration.
2. Forging.
3. Machine Shop Practice.
4. Bent Iron and Hammered Metal Work.
5. Joinery and Cabinet Construction.
6. Wood Turning.
7. Woodworking for Elementary Schools.
8. Manual Training Design.
9. Mechanical Drawing.
10. Primary Handwork.
11. Clay Modeling and Pottery.

DOMESTIC ART AND SCIENCE

1. Organization and Management.
2. Plain Sewing.
3. Dressmaking.
4. Food Study and Cooking.
5. Dietetics.
6. Home Nursing Emergencies and Invalid Cooking.
7. House Furnishing and Decoration.
8. Household Management.
9. Art Needlework and Design.

Credit for Courses

CERTIFICATES are granted to all who successfully complete the work of any of the courses. Full credit will be given future students entering the Stout Training Schools for all work in the regular course which they have completed in the summer school.

Full Information

OUTLINES of courses, time schedules for classes, expenses, equipment, exhibits, and other matters pertaining to the summer sesion may be obtained from a special circular of information just issued, which will be sent on request. Correspondence is invited from any who may be interested in the summer session for itself or as a preliminary to regular courses in the Stout Training Schools.

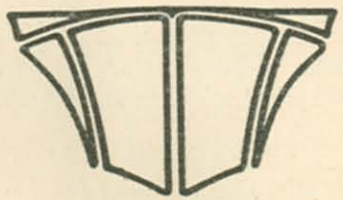
THE BULLETIN OF THE STOUT TRAINING SCHOOLS

THE Bulletin is published quarterly in the interests of school handwork. It is a medium for the discussion of some of the practical and immediate questions relating to the administration of manual training, domestic science, and kindergarten work in the public schools. Problems regarding these subjects are considered from the standpoint of superintendents of schools, teachers of these subjects in public and in private schools, educational workers interested in the school arts and the general public as far as there is a desire to know more of the conduct of these branches in the schools.

Later numbers of the Bulletin will contain special directions for the conduct of classes in high school woodwork, high school metalwork and mechanical drawing; details of handwork courses in the Menomonie public schools, showing methods of carrying on the work; plans and descriptions of manual training schools; illustrated courses in drawing and design; and lesson plans for school handwork.

Address all communication regarding the Bulletin to

L. D. HARVEY,
Supt. Stout Training Schools,
Menomonie, Wisconsin.



CALENDAR FOR 1908-1909

First Semester begins September 21, 1908; ends February 5, 1909
Second Semester begins February 8, 1909; ends June 17, 1909
Holiday Vacation begins December 19, 1908; ends January 3, 1909
Spring Vacation begins April 2, 1909; ends April 10, 1909